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Money or Pizza – Motivation Profiles and Effect of Rewards in Open Source Software Development

Case: FreeNest (Nestronite Oy), Jyväskylä

Karel Knevel

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Abstract

How to reward and maximize performance of online volunteers that are driven by a mix of intrinsic and extrinsic motivations? This case study is aiming to answer that question. Additionally we will add empirical data and increase knowledge about Motivation and the Effects of Rewards in OSSD communities.

During the summer of 2012, we collected Survey- and Interview data on Motivation, Rewards and Performance of 22 Finnish open source contributors working for the SkyNest project. 50 interviews were conducted over a period of 10 weeks following participant's motivation after applying different Reward systems.

We find that Survey- and Interview data show contra dictionary results. We argue that in the case of the SkyNest project, intrinsic and extrinsic motivations are not static but dynamic, change over time and has three dimensions that are equally necessary for reaching desired Performance. We introduce a model called "The Ignition Triangle of Motivation in Open Source Software Development" explaining the thought that there is a dynamic within these three elements of Tasks, Rewards and Management where Intrinsic and Extrinsic Motivation is constantly changing.

Future studies should focus on flexibility in reward systems and testing the theory as needs in OSSD are rapidly changing.

Keywords

FreeNest, Motivation, Rewards, Open Source Software Development, Ignition Triangle of Motivation in OSSD

Miscellaneous

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I want to dedicate this work to my dear children: Mirjam, Hannah and Jan-Michiel.

Karel Knevel

Jyväskylä, 07.11.2014

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1 INTRODUCTION

Open Source Development projects have become a serious source of income for many and companies are more and more depending on contributions generated by volunteers in the online community. How to manage these contributor's and how to maximize their performance, are the key questions in this thesis.

The thesis describes the empirical testing of the effects of motivation and rewards on participation and performance of students participating in the FreeNest project in the summer of 2012. The FreeNest Project is part of the funded, three year SkyNest Research and Development project in the field of Cloud technology.

The FreeNest project is embedded in a network of supporting companies and organizations as shown in Figure 1.

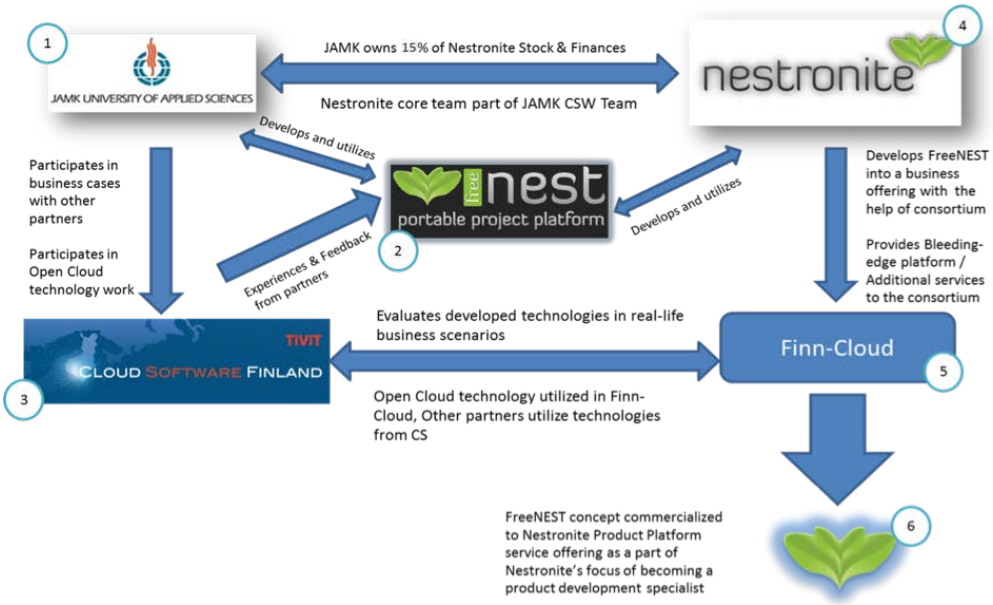


Figure 1: FreeNest embedded Network, (Kuosmanen, 2012)

Companies and organizations using volunteer contributions for Open Source Software Development (OSSD) need to know how to maximize performance in terms of decision to participate and quantity, novelty and usability of contributions from participants that are driven by a mix of intrinsic and extrinsic motivations.

What reward system to apply when and to whom is a main issue for Nestronite when meeting in the spring of 2012.

The theoretical base for this paper is the study of Borst, which contains Motivation in cognitive psychological theory and open source theory. Empirical data have been gathered from a survey and interviews to find new insights into the mechanism of motivation.

The data collection took place from May 21 to August 13, 2012. At the beginning of the project all students (100%) replied to the Work Preference Inventory survey (Teresa M. Amabile, 1994). During the following 10 weeks, we followed the 22 contributors who were working in 5 different teams. The teams used agile working methods using 2 week sprints. After each sprint, two team members were interviewed by the JAMK Living Lab (LL) team members. The main goal of the LL is to promote and support local businesses (Ruuska, 2014). The interviews were written out and documented in their Final Report SkyNEST project of September 2012.

Results, conclusions and new insights are presented, the foundation is laid for a new motivating tool for Nestronite contributors.

1.1 Research challenge

We can find several studies on Motivation and Motivation in Open Source software development. Alexander Hars and Shaosong Ou (2002) on “Motivations on participating in Open- source projects” state that extrinsic motivation such as peer recognition and self-marketing, is a bigger driver than intrinsic motivation. (Hars, 2002). But Literature does not show a uniform answer to what motivates people to contribute. Some agree (Kaufmann;Schulze;& Veit, 2011) others disagree (Lakhani & Wolf, 2005) and again others believe that it is a combination of intrinsic and extrinsic motivation (Borst I. , 2010) or that motivation changes with the type of Crowdsourcing community; Paid or Non-Profit (Pilz & Gewald, 2013)

As empirical studies in Motivation and Rewards of Online volunteers, are still very scarce (Runeson P. a., 2008, s. 131) we will use the conclusions of Borst and the case of Nestronite to add more data and generate new insights.

The FreeNest project development platform was started as a learning environment for students with the benefit of real life experience in adding novelty and future use value contributions to software development. Nestronite, as a Spin-off, was aiming to bring FreeNest to the market at some point (Nieminen, 2013). This would mean that the contributions will be coming from the online crowd in the future.

As FreeNest participants are working in teams we will study Team Motivation Profiles and evaluate the effect of rewards with regard to their performance in decision to contribute and quantity, novelty and usability.

In this thesis, we first evaluate the team motivation profile based on the individual motivation score deducted from the Work Preference Inventory survey (Teresa M. Amabile, 1994). Then we cross-examine the results from the survey with the results from the interviews.

A case study was accepted as the most suitable research methodology for software engineering research (Runeson P. a., 2008).

We decided to use the same (WPI) survey as used by Borst to get an indication of the individual motivation profile and from there to derive a team motivation profile. The interviews were used to analyse the team motivations over time after applying different rewards.

We aim for a reward system for Nestronite that will increase performance, better understanding and to fuel further research on the online development community as a whole.

1.2 Volunteers in Open Source Project development.

The phenomenon of crowdsourcing was introduced by Jeff Howe in 2006 when describing the huge resources that can be found online for performing certain tasks

(Howe J. , 2008). James Surowiecky wrote about the “Wisdom of Crowds” to explain that the online crowds are able to solve complex problems, faster, more creative and cheaper than traditional organizations (Surowiecki, 2004). Wikipedia for example, is made by volunteers that contribute time and knowledge to the development of a global encyclopaedia and is recognized as a reliable knowledge centre. Today millions are contributing every day to different tasks that can be found online. What started off as a fun activity for generating idea’s and creativity, has now become a serious source of income for many and companies are more and more depending on contributions generated by the Online community. The Online software development community is one of five different types of projects that are tapping into information got by crowdsourcing (Admin, 2012). The Software development community is characterized by being highly competitive, fast and extremely difficult to control (Fowler, 2012)

1.2.1 Back ground, facts and figures

A google-search on “crowdsourcing sites” delivered more than 2.8 million results (6.9.2014). Millions of people are giving their contributions free of charge because it is fun or challenging or is giving other benefits such as recognition or improving their skills or even financial rewards. It is thanks to these volunteer people that we can freely use Wikipedia, Linux and many other online services.

Some facts and figures on Software Industry from the Business Software Alliance (BSA, 2007):

- The Software Industry is an engine for employment; 1.7 million people employed in the US in 2007.
- The Software Industry is outperforming the economy. In 2007, the software and related services sector experienced a real annual growth rate of 14%, compared with the real annual growth rate of 2% for all US industries.
- Explosive growth (43%) forecasted in “BRIC” countries (Brazil, Russia, India and China).

With the upcoming of the computer, software is being created and developed to perform certain services. This software needs to be created, produced, distributed and locally installed on every single computer. This is time consuming, expensive and not ver practical. The Cloud environment offers better alternatives.

1.2.2 The Cloud environment or Cloud computing

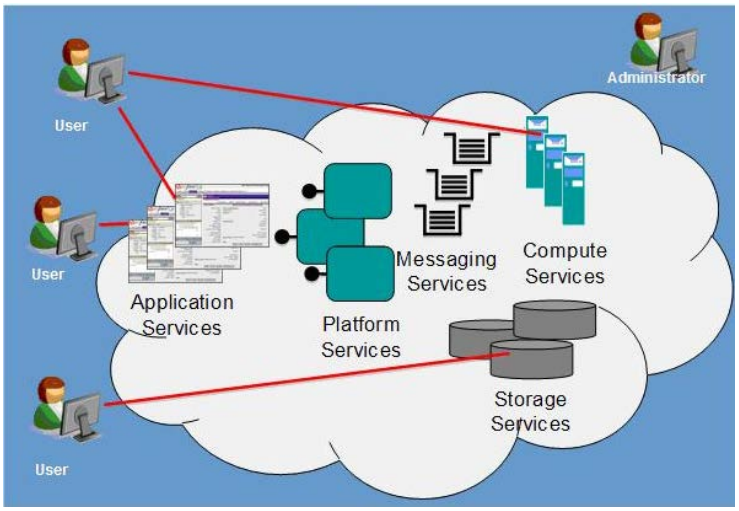


Figure 2Private Cloud, (SreekIyer, 2010)

The cloud can be compared with an electric power plant or water distribution network. Instead of having everybody their own power generator or water well, most of us are hooked up to a distribution network.

The Cloud environment offers the same services as on the personal computer but here the software is available in the Cloud. Advantages are numerous: Secure, remote access from anywhere with an internet connection, lower software costs, little to no set up costs, no need for technicians to setup, no long-term commitments, centralization, compatible with any operating system, always the latest software version available, to name a few.

General services that can be found in the Cloud are:

- IaaS; Infrastructure as a Service
- PaaS; Platform as a Service
- SaaS; Software as a Service

FreeNest portable project platform is using PaaS (Platform as a Service) where software can be developed, maintained and tested.

1.2.3 Open Source Software (OSS)

Open Source Software, or more commonly known as Free Open-Source Software (FOSS), as defined by Wikipedia (Wikipedia, 2014), means that software can be freely accessed, used and modified and distributed by anyone under certain conditions. Usually these are software development engineers who do this for fun, because of the challenges, recognition or improving their skills.

Linux software for example, was developed as an open source product. Linux and Microsoft were long working each at the other end of innovation and development. Today, news is about the love that is in the cloud between Linux and Microsoft (Openness, 2014).

Another example of an open source product, derived from Linux and used by Nestronite is Ubunto, "*On 23 April 2014 Shuttleworth announced that Ubuntu 14.10 would carry the name Utopic Unicorn. Version 14.10 was released on 23 October, having only minor updates to the kernel, Unity Desktop, and included packages such as LibreOffice and Mozilla Firefox and Thunderbird"* (Shuttleworth, 2014).

Recent years have seen a rise of major corporate investments into open source projects. In 2001 IBM reported to have spent over $1 billion in 2001 alone on Open Source projects (Josh Lerner, 2005). Most popular Open Source Project is the non-profit organization Mozilla Firefox with 13124 users (BLACKDUCK/Open HUB, 2014).

In the Nestronite case, the students are the contributors who are making enhancements to freely available software under licences without getting paid for their contributions. Software development has a tradition of sharing and cooperation. In our case the open source code is freely available for learning purposes thus enhancing their skills and opportunities for future employment.

1.2.4 Web-based collaboration

The term directly connected to open source is web-based collaboration because the innovation is a collaborative effort, building on top of the innovations of others and making your innovation again available for other contributors to improve. Collaborative software is software that is available and offered in the Cloud environment.

1.2.5 Portable Product platform

Portability means that software can be used in different environments. When software with the same functionality is produced for several computing platforms, portability will result in cost reduction in development (Wikipedia, 2014).

1.3 Nestronite, FreeNest and SkyNEST

Nestronite is the name of the company that was established in 2011 to promote FreeNest as a Service. In 2013 Nestronite introduced the first prototype of JAXBER, a problem solving application for android and mobile phones, using game-like experiences with a system of tangible and intangible rewards. Additionally Nestronite offers its clients consultant and analytic services.

FreeNest is the name of a portable project platform, open source that integrates commonly used open source software together and allows users to create a new environment for their specific needs (Nieminen, 2013).

In the introduction of this study to Living lab team members, following illustration was used for to explain the FreeNEST portable project platform before designing the interview questions.

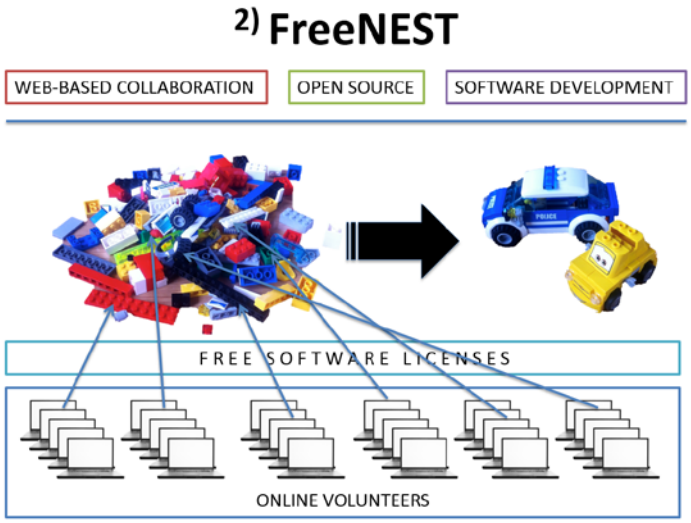


Figure 3. FreeNest product development platform, (Knevel, 2012)

SkyNEST Summer factory is the name of a software education project in JAMK university of Applied Science in Jyväskylä from which FreeNest and Nestronite are born. The project ran from 2011 to 2013 and was supported by Finnish Strategic Centre for Science (TEKES), Technology and Innovation in the field of ICT and digital business (DIGILE).

In the SkyNEST Summer factory, 100+ students contributed to innovation, development and maintenance of open source software, 1000+ ECTS were earned and 20+ thesis's and articles were published (Turunen, 2013).

1.4 Relevance

The last 40 years, development on the Web have been growing with incredible speed. 40 years ago we would not have believed what is normal for us now. To predict what will happen the next 40 years, we have to believe the unbelievable. Predictions are that more and more will be controlled from the Web.

This means that more and more services will be offered from the Cloud. We can already now see that investments are increasing and that Open Source Software Development is a fast growing business activity. Risks are that when Motivations and Rewards are not well understood, firms will suffer the consequences. As empirical

data are still very scarce, it is very useful to gather more empirical data and generate new insights on the subject of Motivations and Rewards in Open Source Software Development.

Today, companies and people are commonly tapping in to resources of the online crowd for example for idea's, design, problem-solving, project/product development and project funding. The list of Examples is numerous and growing: iStockphoto, Mechanical Turk, Innocentive, Amazone to mention a few. It is a fascinating phenomenon that creates huge opportunities for companies and individuals that were never possible before (Surowiecki, 2004) but also means that more and more companies are depending on these online volunteer contributors and need to know what motivates these volunteers.

Sometimes there are monetary rewards, like for example Amazone Mechanical Turk, where monetary rewards are relatively small and InnoCentive, where monetairy rewards can be substantial. But not always are monetary rewards used to fuel the productivity of this phenomenon. Sometimes there are no monetary rewards. It is in this area of Intrinsic and Extrinsic motivation that we find the problem of our study.

Lack of knowledge can result in inappropriately designed reward systems (Borst I. V., 2008). Firms using voluntary contributions can further stimulate active participation (Antoniadis, 2007). Applying wrong reward systems can have fatal consequences for the company.

1.5 Conclusion

To predict the future we have to learn to believe the unbelievable. More and more Services will be offered from the Web. More and more Open Source Software business will be dependent on volunteer contributions. This thesis describes the empirical evaluation of Individual- and Team Motivation Profiles under different Rewards of Open Source Software Development case Nestronite.

We will contribute to the overall share of empirical studies in computer science research.

2 MOTIVATION THEORIES

2.1 Introduction

We say a person is intrinsically motivated to perform an activity if there is no apparent reward except the activity itself or the feelings, which result from the activity. (Deci E. L., 1972). Extrinsic motivation implies that people perform an activity for the sake of receiving compensation or other rewards (Borst I. , 2010). It was reported that a person's intrinsic motivation to perform an activity decreased when he received contingent monetary payments, threats of punishments for poor performance or negative feedback about his performance. Non-contingent monetary payments left intrinsic motivation unchanged and verbal reinforcements appeared to enhance intrinsic motivation. (Deci E. L., 1972).

In this chapter about motivation theories we look at general motivational theories and motivations for volunteer online behaviour in order to create a basis of understanding motivation needed for analysing this study.

Elias Porter defined motivation as a psychological feature that arouses a person to action, while rewards are the goal objectives that reinforce behavior (Wikipedia Elias Porter, 2008). Psychological theory seems to be more concerned about the intrinsic motivation than about the extrinsic motivation.

Earlier theories on individual motivations for participating in F/OSS projects state that external motivational factors in the form of extrinsic benefits are the main drivers (Lakhani & Wolf, 2005).

Lakhani (2005) on "Why Hackers Do What They Do: Understanding Motivation and Effort in Free/Open Source Software Projects" finds that in contrast to these earlier reports, that enjoyment based intrinsic motivations is the strongest and most pervasive driver (Lakhani & Wolf, 2005).

Brabham (2008) concludes that the extrinsic motivation of possibility of earning money is the most prominent motivation for participating in iStockphoto, followed by the intrinsic motivation of generated fun (Brabham, 2008).

Kaufman and Schulze (2011) in "More than fun and money, Worker Motivation in Crowdsourcing – A study on Mechanical Turk" conclude intrinsic motivation is more important than extrinsic motivation (Kaufmann;Schulze;& Veit, 2011).

Pilz and Gewald (2013) in "Does Money Matter? Motivational Factors of Participation in Paid- and Non-Profit-Crowdsourcing Communities" find that that extrinsic factors are much more important in Paid Communities (Pilz & Gewald, 2013)

In FreeNest Case study we deduct our hypotheses from the study of Borst argues that Motivation orientation (in this thesis called "Profile") differs per crowdsourcing type (Borst I. , 2010, s. 147):

Crowdsourcing type	Size of financial reward	Motivation orientation
Free Sourcing	No financial reward	High intr–Low extr
Gift Sourcing	Small financial reward	High intr–Low or High extr
Expert sourcing	Large financial reward	High intr-High extr
Game sourcing	Extreme financial reward	Low intr-High extr

Table 1. Motivation orientation optimal performers per crowdsourcing type (Borst I. , 2010)

Borst based her study and conclusions on 3 different case studies, Open Source Literature and Motivation theories in cognitive psychological literature such as Deci, 1971; Deci and Ryan, 1985 and Amborse and Kulik, 1999.

2.2 Concepts in motivation theory

2.2.1 Intrinsic and Extrinsic Motivation in OSSD

Literature on human motivations differentiates between those that are intrinsic (the activity is valued for its own sake) and those that are extrinsic (providing indirect rewards for doing the task at hand) (Lakhani & Wolf, 2005).

In this thesis we follow the motivation concepts of the Work Preference Inventory (WPI) survey (Teresa M. Amabile, 1994) where primary intrinsic factors are described as Enjoyment (E) and Challenge (CH) and primary extrinsic as Compensation (C) and Outward (O). WPI is a motivation scale measuring self-reported motivation also used by Borst.

Secundary elements of intrinsic and extrinsic motivation are described in Table 1 and 2 below.

Intrinsic motivation like Social Responsibility (or Altruism, doing something good) and extrinsic motivation like Future use Value, where initially included in the survey but not included in the analyses in order to make it better comparable with the findings from Borst.

Linus Torvalds's initial motivations to write Linux was his dissatisfaction with Minix, a simple teaching operating system designed to educate students (Mauerer, 2008). Dissatisfaction can be qualified as intrinsic motivation and would be categorized under the secondary intrinsic motivation of Task involvement.

a	Self determination	CH
b	Competence (Mastery orientation and preference for challenge)	CH
c	Task involvement (task absorption and flow)	CH
d	Curiosity (preference for complexity)	CH
e	Interest (Enjoyment and fun)	E

Table 2. Intrinsic Motivations (Teresa M. Amabile, 1994)

f	Evaluation concerns	O
g	Recognition concerns	O
h	Competition concerns	O
i	Focus on money or other tangible incentives	C
j	Focus on dictates from others	O

Table 3. Extrinsic Motivations (Teresa M. Amabile, 1994)

According to these secondary motivations, the interviews have been analyzed. There are other models used in literature. Some have separated two categories within the intrinsic model (Enjoyment based intrinsic motivation and Community based intrinsic motivation) and three categories in the extrinsic model (Immediate payoffs, Delayed payoffs and Social motivation) (Pilz & Gewald, 2013, s. 169). Extensive definitions of Motivation are described in Borst Annex A, s. 169 (Borst I. , 2010, s. 169).

2.2.2 Obligation/Community based intrinsic Motivation in OSSD

Most studies in OSSD are focusing on motivation of individuals, but Lakhani and Wolf also refer to the strong sense of community identification and adherence to norms of behavior and that participants in OSS communities have strong collective identities. They are referring to Lindenberg (2001) who states that conforming to the norms/expectations of the group can be described as intrinsic motivation (Lakhani & Wolf, 2005).

In the Nestronite case, contributors are working in teams and encouraged by the core team to collaborate.

2.2.3 Mix of intrinsic and extrinsic motivation

Lindenberg also suggests that a mix of intrinsic and extrinsic motivations can be present at the same time (Lakhani & Wolf, 2005).

Maria Antikainen and Heli Vaataja conclude that both monetary and non-monetary rewarding methods are important in 12 open innovation communities (Maria J. Antikainen, 2010).

It makes sense to use a motivation profile or even a scale indicating the level of intrinsic and level of intrinsic motivation. In the Nestronite case we will use indications of mixed motivations by using Low or High Intrinsic or Extrinsic motivation. The level of Intrinsic or extrinsic motivation is beyond the scope of this thesis.

2.2.4 Rewards

As motivation is defined as the psychological feature that arouses an individual into action, rewards are the goal objectives that reinforce behavior (Wikipedia Elias Porter, 2008). Type of Rewards can be financial or non-financial (tangible or non-tangible social) rewards. Rewards also vary in contingencies (Borst I. , 2010, s. 170).

Reward contingency	Description
Task non-contingent	Rewards delivered regardless task involvement
Task contingent	Rewards given for doing the task
Engagement contingent	Rewards for engaging in the activity without the requirement to finish the task
Completion contingent	Rewards for finishing or completing the task
Performance contingent	- Rewards for executing a complex activity, for example solving a problem - Rewards for achieving - Rewards for surpassing a specific score - Rewards for meeting or exceeding others

Table 4. Typology of reward contingencies (Ryan et al, 1985; Deci et al, 1999; Cameron 2001)

2.3 Conclusion

Many theories argue that motivations are Intrinsic or Extrinsic or even a mix of the two when performing a specific Task. It seems liable to believe that Individual Motivation Profile could be indicated as L/L, L/H, H/L and H/H. How does this apply to Teams? And what if Motivations are changing?

We will examine Team Motivation Profiles based on the Individual Motivation Profile of contributors and examine effect of Rewards on different Team Profiles that we find in the Nestronite Case.

3 THEORETICAL FRAMEWORK

3.1 Our approach in resolving

We test and explain Effects of Motivations and Rewards by taking the study of Borst (deductive study approach) and the case of Nestronite (pragmatic study approach) (Mark Saunders, 2009) to gather more empirical data and create new insights. We question the outcomes of Borst and others who argue that motives are intrinsic, extrinsic or a mix of the two when performing a specific task.

We introduce Team Motivation Profiles deducted from the WPI because we expect and want to test if, Team Motivation Profiles and Rewards will show similar effects in performances. We cross-examine the results with the Team Profiles deducted from the interviews.

With Borst we expect that a mix of intrinsic and extrinsic motivations are present in Individuals and Teams. We want to test different performances with absence or presence of Rewards.

Rewards are Individual- and Team- Rewards, Engagement- and Performance contingent, Financial-, Reputation- and Fun Rewards.

3.1.1 Deduced Hypothesis (DH) from Borst

Referring to Borst who argues that the motivation orientation of optimal performers differ per crowdsourcing type, we argue that Teams with High Intrinsic and Low Extrinsic Motivation Profiles will perform best in unrewarded activities.

DH1: Nestronite Teams with H/L motivation profile perform best in unrewarded activities with respect to quantities and useful contributions (Borst I. , 2010, ss. 71, 147)

Similarly we argue that Teams with High Intrinsic and High Extrinsic Motivation Profiles will perform in best in rewarded activities.

DH2: Nestronite Teams with H/H motivation profile perform best in rewarded activities with respect to quantity and usefulness (Borst I. , 2010, ss. 71, 147)

3.1.2 Operational Hypothesis (OH)

Underlying to DH1 and DH2 we argue and need confirmation that the Work Preference Inventory will reflect the Individual Motivation Profile of participant.

OH1: The outcome of the WPI will be an accurate reflection of Individual Motivation Profile of participants.

We also argue and need confirmation that the Team Motivation Profile deducted from the Individual Motivation Profile from the WPI is accurate and can be used for further theorizing.

OH2: A Team Motivation Profile deducted from the average of all Team participants Individual Motivation Profiles will give an accurate reflection of reality.

Additionally we argue that when the Individual Motivation Profiles of participants are known, we can put Individuals with similar Motivation Profile together in one Team so that we will have maximum performance with regard to decision to contribute and quantity, novelty and usefulness.

OH3: With the outcome of the WPI survey on Nestronite contributors we can create the desired Team Motivation Profile that will have positive effects on the decision to contribute and quantity, usefulness and novelty.

3.2 Conclusion

In this chapter, with reference to the conclusions of Borst in the theory section, we question theories referred to and lay out the bases for new research approach for a reward system that is based on the Team motivation profile.

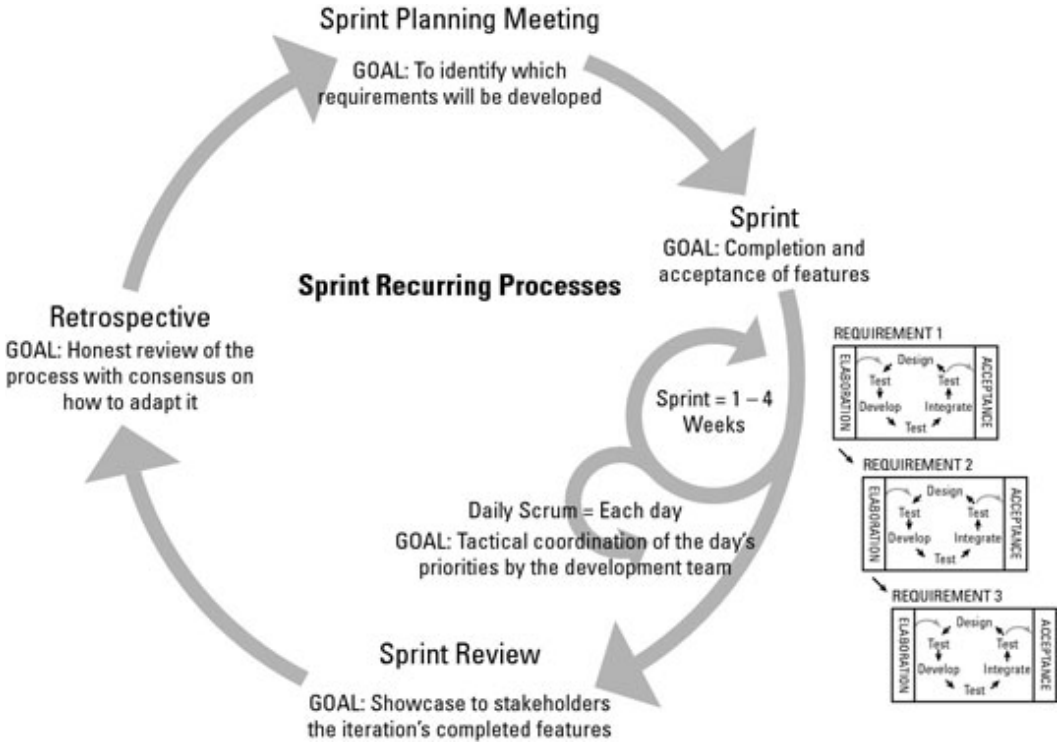
4 METHODOLOGY

4.1 Introduction

This study describes the case study of an open source software development community. The selection of Nestronite for this thesis was based on their need for knowledge on effective reward systems. Nestronite is a start-up company embedded in the structure of the JAMK-University of Applied Science where students can get experience and develop their skills in real life Open Source Software development. The 22 Participants in the FreeNest project were working in 5 different teams:

1. User Experience (UX), 6 people
2. CLOUD, 3 people
3. Maintenance, 4 people
4. Feature 1 (F1), 5 people
5. Feature 2 (F2), 4 people

Team 1, 2 and 3 used “Kanban” project work method. Team 4 and 5 used the “Scrum” project work method. All teams worked in 2 – 3 week “Sprints”.



(Mark C. Layton, 2012) (Layton)

After every Sprint, teams would come together for the “Review day”. The review day consists of two parts: morning and afternoon. In the morning the teams presented their results to the other teams and in the afternoon, the teams reflected on their own performance and decided on new strategies for the next sprint. The afternoon session was recorded with video.

4.1.1 Work Preference Inventory (WPI)

First, data collection was done via a survey. For this survey the Work Preference Inventory (WPI) model of Amabile was used as shown in Appendix 1. Questions have been slightly modified for the Nestronite case. Borst used this research design to gather quantitative data. For the Nestronite case the survey is used to detect the Individual Motivation Profile of participants. From the total of Individual Motivation Profiles in one team, a Team Motivation Profile was conducted that should represent the Motivation Profile of the team.

Respondents had to answer to the questions with fully disagree (1), disagree (2), disagree to some extent (3), agree to some extent (4), agree (5) or fully agree (6).

The survey used, originally included questions referring Social Responsibility and Future use Value. These are not used in the final evaluation of data. We also found later that few of same questions were repeated in the survey. These were deleted later and not used in the final evaluation.

4.1.2 Interviews

Secondly, data collection was done through interviews. After every two weeks with 2 members of the team over a total period of ten weeks, interviews were conducted resulting in a total of 50 interviews. The collection of interview questions are given in Appendix 2.

From each team, the team leader was the only team member that had to participate in every interview. Other team members could take turns. The individual motivation data were collected only in order to be able to deduct the team motivation profile

for each team and to find out the motivation profile of the whole group (22 individuals). As common for interviews we used non-dichotomous questions in order to create as much as possible information (Kananen, 2011, s. 55). Semi-structured Interview questions were determined in advance. Interviewers were students in “Living Lab Team” who could collect study points by working in one of the Living Lab projects. Interviewers were trained and encouraged to create interaction and reflection with the interviewee. Putting together the questions was a team effort with Living Lab Team members. Interviewers were a mix of Finnish International Business students and exchange International Business students from other cultures such as Vietnam and Mexico. After each interview the answers were described and reported in the Sprint Report. In the Sprint Report also assessment criteria were collected from the Core Team and reported. The interviewers also wrote down a summary of their observations.

The Nestronite case gave us a unique opportunity to study the motivation over a longer period of time while applying different rewards. The 50 Interviews have been analysed 3 times in total in order to get a consistent result in Team Motivation. Based on these results the Team Motivation Profile was conducted that represents the motivation profile of the team.

Cross examination was done to compare and explain different results.

4.1.3 Rewards

During the first sprint, no Rewards were applied to any of the Teams. After the first sprint Teams or one Individuals in the Team would be rewarded with either Team Reward: pizza, Compensation Rewards: money and one day off, or Recognition Reward: “Champion”. Choosing the Rewards was done in negotiation with the core team. There was some discussion to whether or not use money as a reward and also otherwise choosing the rewards was challenging and (looking back) could have been given more thought for example by applying rewards for each week that have a different contingencies as described in Table 4.

A Reward schedule used for this case was made beforehand.

	Sprint 1	**Sprint 2**	**Sprint 3**	**Sprint 4**	**Sprint 5**
Maintenance	No reward	Champion	Pizza	Money	Money
Cloud	No reward	Day off	Money	No reward	Champion
UX	No reward	Pizza	Day off	Money	No reward
F 1	No reward	No reward	Champion	Pizza	Day off
F 2	No reward	Money	No reward	Champion	Pizza

Table 5. Reward schedule

4.1.4 Performance data

Performance data were collected during the assessment day at the end of every sprint and reported in the same Sprint report that holds the interviews. The performance data that were collected were as follows:

- Quantity (no. of commits/per person),
- Time used (total hours/per person),
- Accepted/Rejected (if Yes: 5, if No: 0),
- Novelty (if Yes: 5, if Neutral: 2, and if No: 0) and
- Future Use Value (if Yes: 5, if Neutral: 2 and if No: 0)

Reported data were however lacking clear scales of measurement. Team Performance data vs. Team Motivation Profiles were analysed if supporting, partly supporting or not supporting hypotheses.

4.1.5 Additional analysis; Mr. X

Because of differences in results between Survey and Interviews we decided to add at the last moment an unstructured interview with Mr. X who scored high on Intrinsic Motivation in the Survey but scored highest on Extrinsic Motivation in the Interviews.

4.2 Scales of Measurement

4.2.1 Survey

4.2.1.1 Individual Profile from survey

The Work Preference Inventory is designed to assess individual differences in intrinsic and extrinsic motivational orientations. Digium Enterprise software (QuestBack Ltd) was used to put together and present the survey to the participants who could electronically reply. Results were recorded by Digium in an Excel sheet and later used for evaluation.

In Appendix 1 survey questions are presented and allocated as Enjoyment or Chalenge (Intrinsic motivations) or Outward and Compensation (Extrinsic motivations). An example of a typical score in Motivation is given in Table 6.

	INTRINSIC		**EXTRINSIC**	
	Enjoyment	**Challenge**	**Outward**	**Compensation**
Mrs. A:	4	2.7	3.4	-0.4

Table 6. Example Survey Individual Motivation Profile

The minus means that the question was reverse question.

The average intrinsic and average extrinsic motivation of Mrs. A is calculated from the average between enjoyment and challenge for intrinsic and outward and compensation for extrinsic as shown in Table 7:

	INTRINSIC	**EXTRINSIC**
Av. Mrs. A	(4 + 2.7)/ 2= **3.4**	(3.4 -0.4)/ 2= **1.5**

Table 7. Average Motivation Profile in numbers for Mrs. A

From the total of 22 participants we know the average motivation score in intrinsic and extrinsic motivation:

	INTRINSIC	**EXTRINSIC**
Average all	(total intrinsic)/ N= **3.8**	(total extrinsic)/ N= **1.9**

Table 8. Average Motivation Profile in numbers from all 22 participants

If Average Individual intrinsic ≤ Average all intrinsic = > **L**ow intrinsic motivation

If Average Individual intrinsic > Average all intrinsic = > **H**igh intrinsic motivation

If Average individual extrinsic ≤ Average all extrinsic = > **L**ow extrinsic motivation

If Average individual extrinsic > Average all extrinsic = > **H**igh extrinsic motivation

The motivation profile of Mrs A is thus "labelled" as Low intrinsic/Low extrinsic or L/L. Based on the scores of each individual contributor, every respondent is "labelled" as L/L, L/H, H/L or H/H. The individual motivation profile has only been used to deduct the team motivation profile and the motivation profile of the whole group (22 individuals) and not for quantitative data analyzes as the number of respondent (N) was far too low and would not present scientifically reliable data (Kananen, 2011).

Just for the sake of fun and challenge (Intrinsic Motivations) weighted average was calculated from the numerical data from the survey.

4.2.1.2 Team Profile from Survey

The Team Motivation Profile is deducted from the survey reflects the Motivation of participants on that specific moment. Example is shown in Table 9.

	Intrinsic			Extrinsic		
	Enjoyment	Challenge	**Av. Intrinsic**	Outward	Compensation	**Av. Extrinsic**
Mrs. A	4	2.7	**3.4**	3.4	-0.4	**1.5**
Mr. B	4.5	3.0	**3.8**	3.1	1.2	**2.2**
Mr. C	4.5	3.3	**3.9**	3.3	0	**1.6**
Mr. D	3.75	2.8	**3.3**	3.0	0.8	**1.9**
Mr. E	4.75	3.3	**4.0**	3.5	1.4	**2.5**
Team Av.	(Av Intr A, B, C, D, E)/ 5= **3.7**			(Av Extr A, B, C, D, E)/ 5= **1.9**		
Team Profile	Team Av ≤ 3.8 => **L**ow Intrinsic			Team Av ≤ 1.9 => **L**ow extrinsic		

Table 9. Team Motivation Profile Survey: L/L

Same standards for allocating “L” or “H” is used as used for Individual Motivation Profiles. As such this example Team Motivation Profile is labeled as L/L, meaning low intrinsic motivation/Low extrinsic motivation.

4.2.2 Interview

4.2.2.1 Individual Profile from Interview

Initial analyzing of the Interviews was done following the instructions of Kananen. But after some analyzing, routine quickly recognized the keywords indicating key secondary motivations. Appendix 3 shows an example of interview analyses from Final report Skynest Project by Living Lab team, September 2012 UX Team, Sprint 1 pages: 15, 16, 17 and 18. Originally also Social Responsibility and Future Use Value were included in the evaluation but these have been disregarded in the final evaluation in order to be more consistent with Borst results.

Same Scales of Measurement are used for the interview evaluation as for the Survey evaluation as shown in example below:

	E	Ch	O	C	Av Intr	Av Extr
Mr. Y	0	2	4	3	(0+2)/ 2= **1**	(4+3)/ 2= **3.5**

Table 10. Example Average Individual Motivation Profile from interview Mr. Y

The Average Intrinsic Motivation of all participants from interview was: 2.2 and Average Extrinsic of all participants from interview was: 2.4. Individual Motivation Profile for Mr. Y would be indicated as L/H

4.2.2.2 Team Profile from Interview

The team Motivation Profile was deducted from the Individual Motivation Profiles similar as done for the survey using the same Scales of Measurement.

MAINTENANCE	Enjoy	Challenge	Social Responsibility	Future Use Value	Outward	Compensation
1st psrint	3	4	0	0	2	0

	0	0	0	0	9	0
2nd Sprint	0	0	0	0	7	1
	0	3	0	0	6	2
3rd Sprint	5	1	0	0	3	1
4th Sprint	0	0	0	0	1	0
	2	1	0	0	1	2
5th Sprint	1	1	1	0	2	0
	1	2	0	0	3	1
Total	12	12	1	0	34	7
Total Team average	1,3	1,3	0,1	0	3,8	0,8
Av Intr/Extr		1,3				2,3

Table 11. Example Motivation Score table for Maintenance Team during sprint 1 - 5.

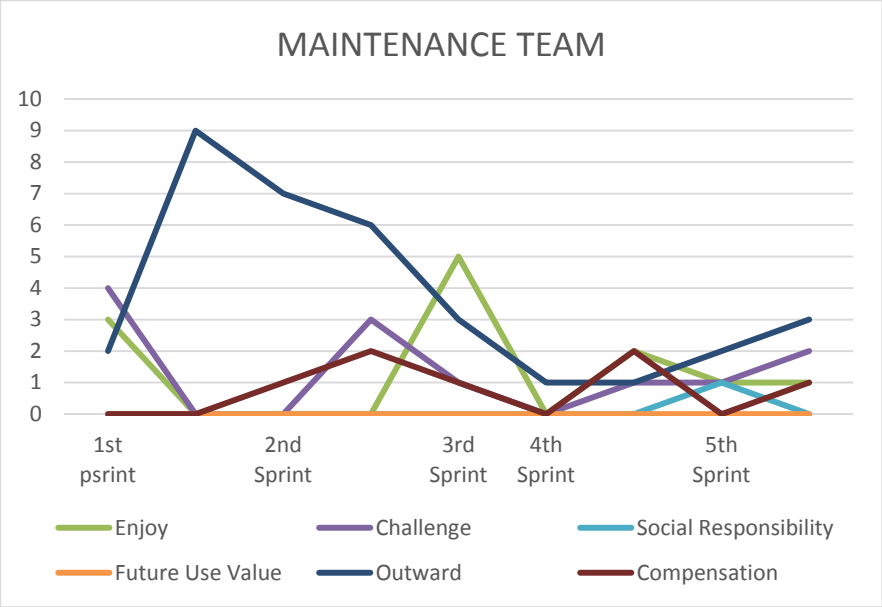


Figure 4. Graphical presentation of the Maintenance Motivation Profile during Sprint 1 - 5

The score for Social Responsibility and Future Use Value were ignored and excluded from the scope. Scales of Measurement are the same as before meaning that the Maintenance Team Motivation Profile is labelled as L/L. The overall scores of all teams are shown in Appendix 6.

4.2.3 Criteria for Rewards

The criteria for rewards were given as shown in Table 4 and rewards were given according to schedule, as shown in Table 5.

The Living Lab Sprint reports do not describe exactly how rewards were given.

4.2.4 Performance

The Scales of Measurement for Performances has been unsufficient in that way that performance for Novelty and Future Use Value were not consistently reported. This means that only the performance of Quantity could be measured with regard to Team Motivation Profile and applied Rewards.

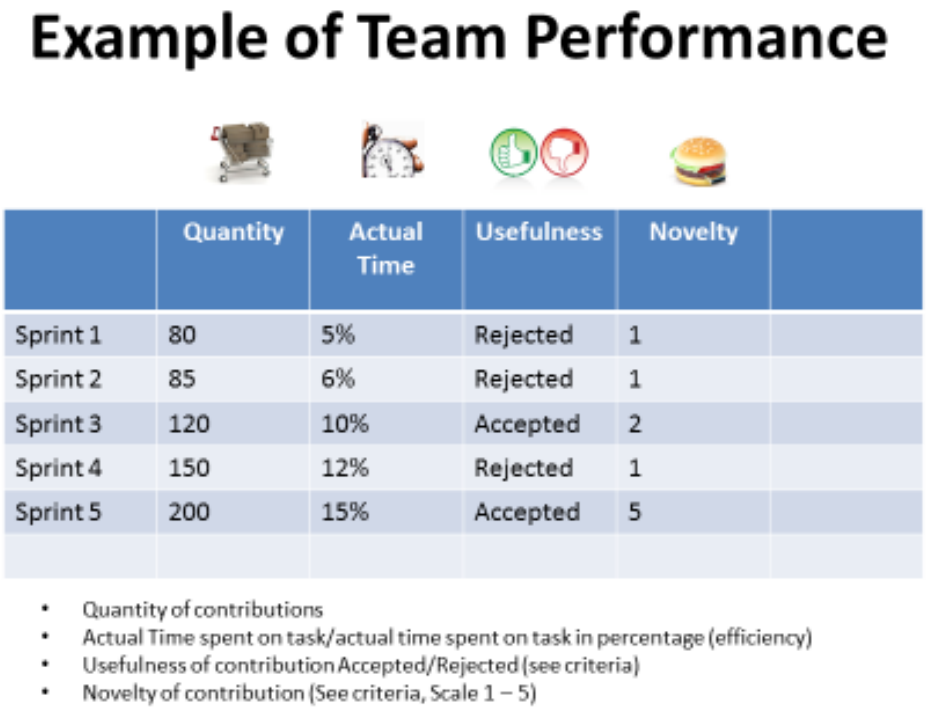


Figure 4. Slide from information presentation for Living Lab Team

4.2.5 Additional analysis; Mr. X

We used the same method for analyzing as for the other interviews but this time only once. Interview was done by author, free and unstructured.

4.3 Conclusion

In this chapter we explained the work methods of Nestronite. We explained how we identified the Individual Motivation Profile and Team Motivation Profile from WPI Survey data and Interview analyzes. We explained Scales of Measurement.

5 THE NESTRONITE CASE

5.1 Introduction to Nestronite

The study was performed in the summer of 2012 from May to August during the FreeNest summer factory where students can collect study credits during summer time. Participants in the FreeNest project is can have fun, increase their knowledge and skills, get recognition get study credits while working on real life open source projects. The FreeNest project 2012 had 22 participants. FreeNest started in 2011 with the Cloud Software program (CSW). At the end of 2011 Nestronite Oy was established as: Computer hardware and Software consulting. In 2013 turnover grew to 12.000 euro more than double compared to the previous year (5.000 euro) (Taloussanomat, 2014). Nestronite is expected to be a fast growing company.

The participants in the SkyNest Case are 24 JAMK university students from different programs. 22 men and 2 women in the age between 20 and 31 years old, all of Finnish nationality and fields of study: Media engineering, Software engineering, Network engineering and International business.

Participants are divided into 5 teams and one Core team. The Core team is not part of the case other than that they provide tasks, evaluate and assess the performance of the teams. Each team was given specific focus area as described by Marko Rintamäki (10/2014):

5.1.1 Maintenance team

Bug fixing, testing of the already existing setup of FreeNest, replacing delivery of the product, keep it up and running as well as building new packages.

5.1.2 User Experience Team (UX)

Thinking of user interfaces and FreeNest.org page. How does it feel graphical? Outlook, branding and design.

5.1.3 Feature 1 (F1)

Building and packaging new features for FreeNest and Maintenance. GIT management and components for safe Source code (Now available everywhere). Dashboard.

5.1.4 Feature 2 (F2)

Building the Preliminary Team board as main job. At the end of 2013 last version was written.

5.1.5 Cloud

Building Cloud environment, Cloud platform/ building competence. Own cloud, junk cloud, making that happen. Now (10/2014) it is Open stack cloud.

5.1.6 Core team

The Core Team is Organizing, giving vision, giving direction where to go. Ilkka Turunen as Scrum master and Marko Rintamäki as product owner.

5.2 Data collection

5.2.1 Survey data

Digium Enterprise software (QuestBack Ltd) was used to put together and present the survey to the participants who could electronically reply. The questions were inspired by the WPI (Teresa M. Amabile, 1994) and modified accordingly. An invitation was send to all 22 participants by Email. All contributors (100%) completed the survey. All data of all 22 respondents was used in the analyses.

As mentioned by Borst, there might have been a possibility of self-selection, meaning that highly intrinsically motivated are more likely to respond. This would result in a high proportion of high intrinsically motivated people.

All data have been used as collected by the Digium Enterprise except that repeated questions were not included in the analyses.

5.2.2 Interview data

For the collection of Qualitative Research data, LivingLab students conducted interviews from May – August 2012, 10 weeks. Living lab students were well informed and prepared when starting with the case. Motives for Finnish participants in the Living Lab was that they would collect study credits during summer time and social benefits (money) from Finnish Social services. Participants from other countries participated in order to collect study credits. All LL participants were in the same age group and all were International Business students of JAMK- University of Applied Sciences. The English language skills were perhaps somehow different.

During the 10 weeks, some of the LL participants went on a vacation. Then other people took over.

After each sprint, the performance of the team (Table 4) was collected and reported in the Sprint report (Appendix 2) for analyzing.

During the interviews, video recorders recorded the interview session. These have not been used in this analyses.

Of the people being interviewed, one always had to be the team leader. The second team member was selected randomly. This might result in shorter answers from the team leaders when asked the same question for the fifth time or he/she might be referring to earlier answers. For the analyses we did not check the earlier answers but only recorded the motivations showing in that specific interview. This might be one reason that it seems that motivation is declining over time for most teams.

From the interview abstractions, words, phrases, thoughts were captured that had contained idea's as described in Table's 2 and 3. Subsequently the similar idea's were counted for each type of Motivation.

5.2.3 Performance data

Performance data were collected by the Living Lab Team members at the end of each sprint during the Review day. Performance data to be collected were Quantity, Time

used, Accepted/Rejected (by the Core Team), Novelty and Future use Value as shown in Figure 4. Even though we used the Digium Enterprise software to collect the Online Team Performance Assessment data from the Core Team, we didn't use these data but only the performance data from the LL Team members for analyzing and making our conclusions. For further evaluation it would be interesting to also include the data from the Online Team Performance Assessment in the evaluation.

5.2.4 Additional analysis: Mr. X

When cross examining the results between survey and interviews we noticed that the total average scores between the two give opposite results.

	Intrinsic	Extrinsic
Total average Motivation Survey	3.8	1,9
Total average Interviews	2.3	2.5

Table 12. Overall average Motivation results from Survey and Interviews

As presented in Table 12 we can see that results from the survey indicate a strong intrinsically motivated group of people, while the interviews indicate a slightly extrinsically group of participants.

For one individual in the group of participants the difference was even more evident. We decided to check the results with that particular individual called Mr. X and ask him what result according to his own understanding is giving the more accurate picture of his motivation profile. Additionally we had an extra interview to find out more about Mr X and his motivations.

From the Survey, Mr X got as Individual Motivation Profile L/L. Meaning that he has low intrinsic motivation and low extrinsic motivation. The actual Survey score is given in Table 13.

	INTRINSIC		**EXTRINSIC**	
	Enjoyment	**Challenge**	**Outward**	**Compensation**
Mr X	3.5	2.5	2.7	0
Av Mr X	(3.5 +2.5)/ 2= **3**		(2.7+0)/ 2= **1.35**	

Av All	3.8	1.9
Mr X MotivationProfile	**L/L**	

Table 13. Mr X Individual Motivation Profile from Survey

From the Interviews, Mr X got as Individual Motivation Profile

	INTRINSIC		**EXTRINSIC**	
	Enjoyment	**Challenge**	**Outward**	**Compensation**
Mr X	0	0.5	5.3	1.3
Av Mr X	0.3		3.3	
Av All	2.3		2.5	
Mr X MotivationProfile	**L/H**			

Table 14. Mr X Individual Motivation Profile from Interviews

In order to be able to explain these somewhat contra dictionary results, we conducted an additional interview with Mr. X. The written out impression from this interview about his motivational profile is given in Appendix 4.

5.3 Results

5.3.1 Survey results

As the WPI survey is a Quantitative data collection tool, the Digium Enterprise software (QuestBack Ltd) programme automatically analyzed the results and printed out Average Table and Scale Reports. We used the results from the survey to calculate the weighted average (w.a.) and observe that Intrinsic Motivation Fun/Enjoyment is scoring highest (4,4) followed by Intrinsic Motivation Challenge as second highest (3,6). To our surprise we find that Extrinsic Motivation Compensation has a negative score. For analzying the Inidividual and Team Motivation Profiles we used the calculated average from the Survey. We did not analyze the Survey results any further since there is little scientific value with respondents N=22.

		I Fully disagree (1)		Disagree (2)		Disagree to some extend (3)		Agree to some extend (4)		Agree (5)		Fully agree (6)		
FreeNest	N	n	%	n	%	n	%	n	%	n	%	n	%	w.a
Enjoyment	22	0	0 %	7	8 %	7	8 %	31	35 %	29	33 %	14	16 %	4,4
Challenge	22	-2	-1 %	1	1 %	5	3 %	48	27 %	49	28 %	31	18 %	3,6
Outward	22	8	3 %	24	9 %	48	18 %	76	29 %	57	22 %	7	3 %	3,1
Compensation	22	3	3 %	8	9 %	1	1 %	-6	-7 %	-4	-5 %	-2	-2 %	-0,4

Table 15. w.a. calculation from Survey results

We have to remember that number (n) looks high because this number represents the number of participants that answered to that question multiplied with the number of questions in the survey for that category. In the w.a. calculation this is again corrected by dividing the total with the number of questions in the survey for that category. The total of “n” for one category divided by the number of questions for that category is always equal to N (=22).

Below (Table 16) we present a summary of the Survey results with calculated Average Individual Intrinsic Motivation, Average Individual Extrinsic Motivation. From these we calculated the Average Team Intrinsic Motivation and the Average Team Extrinsic Motivation. Finally we determined the Team Motivation Profile (L/L, L/H, H/L or H/H) for each Team by comparing the Team Intrinsic and Team Extrinsic values with the Total Average Intrinsic/ Extrinsic Motivation.

We find two teams (Maintenance and F1) having Low Intrinsic Motivation and Low Extrinsic Motivation, two teams (F2 and Cloud) having Low Intrinsic Motivation and High Extrinsic Motivation and only one team (UX) having High Intrinsic and Low Intrinsic Motivation. This last team is expected to perform best in unrewarded activities according to Borst.

In Figure 6 the results are presented in a graph. The graph is clearly indicating that Compensation scores much lower than the other three Motivations Enjoyment, Challenge and Outward.

The question is now raised if we should also here use weighed average (w.a.) for determining the Team Motivation Profile instead of the average.

Summary Survey Team Motivation Profile Analyzes

		E	CH	O	C	Av. Ind Intrin.	Av. Ind Extrin.	Av Team Intr	Av Team Extr	Team Profile Intr/Extr
MAINTENANCE	Indiv. A	3.5	2.5	2.7	0.0	3.0	1.4			
	Indiv. B	4.8	2.8	2.8	0.0	3.8	1.4	3.7	1.5	L/L
	Indiv. C	5.0	3.5	2.6	0.2	4.3	1.4			
	Indiv. D	4.5	2.8	2.8	0.8	3.7	1.8			
UX	Indiv. E	5.0	4.0	3.0	0.6	4.5	1.8			
	Indiv. F	5.3	3.4	3.9	0.6	4.3	2.2			
	Indiv. G	5.0	3.1	3.3	0.2	4.0	1.7	4.2	1.9	H/L
	Indiv. H	4.8	3.3	3.6	0.6	4.0	2.1			
	Indiv. I	4.5	2.9	3.4	0.6	3.7	2.0			
	Indiv. K	5.5	3.5	2.9	0.6	4.5	1.8			
F1	Indiv. L	4.0	2.7	3.4	-0.4	3.4	1.5			
	Indiv. M	4.5	3.0	3.1	1.2	3.8	2.2			
	Indiv. N	4.5	3.3	3.3	0.0	3.9	1.6	3.7	1.9	L/L
	Indiv. O	3.8	2.8	3.0	0.8	3.3	1.9			
	Indiv. P	4.8	3.3	3.5	1.4	4.0	2.5			
F2	Indiv. Q	4.8	3.7	2.9	0.6	4.2	1.8			
	Indiv. R	4.8	3.3	3.7	0.8	4.0	2.3	3.8	2.1	L/H
	Indiv. S	4.3	3.5	3.7	0.8	3.9	2.3			
	Indiv. T	3.5	2.5	3.4	0.8	3.0	2.1			
CLOUD	Indiv. U	5.0	3.6	2.6	0.8	4.3	1.7			
	Indiv. V	3.8	2.5	3.4	0.4	3.1	1.9	3.7	2.0	L/H
	Indiv. W	4.5	2.9	3.5	1.2	3.7	2.4			
	TOTAL	99.8	68.8	70.6	12.6					
	AVERAGE	4.5	3.1	3.2	0.6					
	AV INTR/EXTR	3.8		1.9						

E: Enjoyment, CH: Challenge, O: Outward, C: Compensation

If Av. Team Intr ≤ Total Av. Intr => Low (L)

If Av Team Intr > Total Av Intr => High (H)

If Av Team Extr ≤ Total Av Extr => Low (L)

If Av Team Extr > Total Av Extr => High (H)

Table 16. Summary Survey Team Motivation Profile analyzes

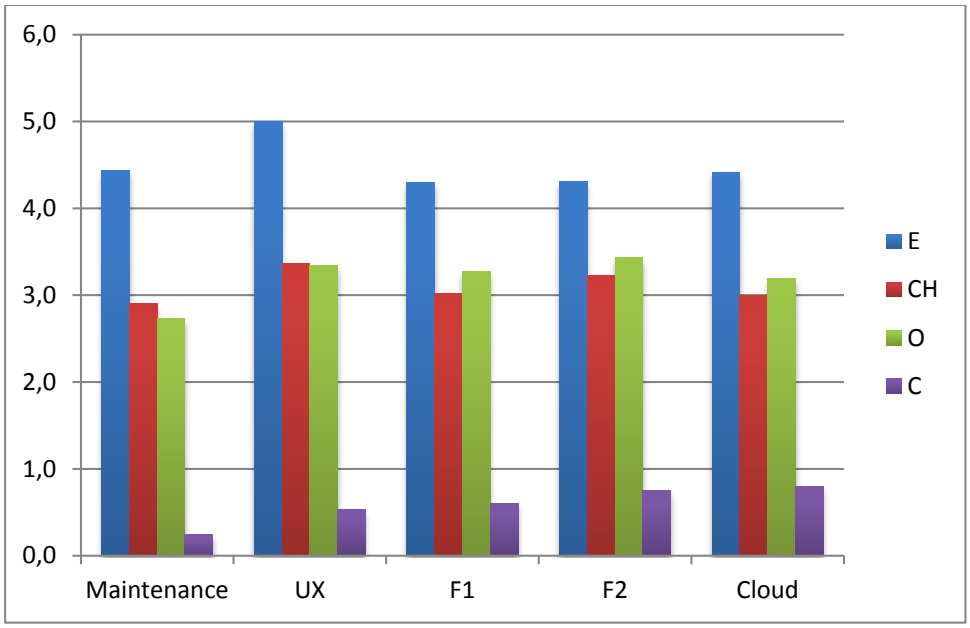


Figure 6. Graphic presentation of Team Motivation Profile according to Survey

Again we observe that for all teams Intrinsic Motivations Fun/Enjoyment is scoring highest and Extrinsic Motivation Compensation is scoring lowest. Both Intrinsic Challenge and Extrinsic Outward are scoring at average Motivation levels with a slightly higher score of Extrinsic Motivation Outward for teams F1, F2 and Cloud.

The User Experience Team (UX) is scoring highest in Intrinsic Motivation Fun. Their Intrinsic Motivation seem to get fueled by their activities in graphic and visual presentation and communication.

5.3.2 Interview results

The Interviews with all teams (5), after each sprint (5) with 2 team members every time, have been analyzed 3 times. When the same result was found at least two times, those are the results that are presented as Table (Table 19) and graphically (Figure 4) for further analyzing. Results cover the average Motivations over the whole period of 10 weeks using different rewards.

2nd analyzes

	E	CH	O	C
TOTAL	105	113	199	38
Average	2,1	2,3	4,1	0,8
Av Intr/Extr	2,2		2,4	

	E	CH	O	C	AV INTR	AV EXTR	PROFILE
Maintenance	1,3	1,3	3,8	0,8	1,3	2,3	**L/L**
UX	3,2	1,6	5,4	0,4	2,4	2,9	**H/H**
Feature 1	1,9	1,7	4,8	1,8	1,8	3,3	**L/H**
Feature 2	2,2	1,6	2,2	0,5	1,9	1,4	**L/L**
Cloud	1,6	3,5	2,9	0,2	2,6	1,6	**H/L**

Table 17. 2nd and finally used analyzes of Interview Motivation Profile

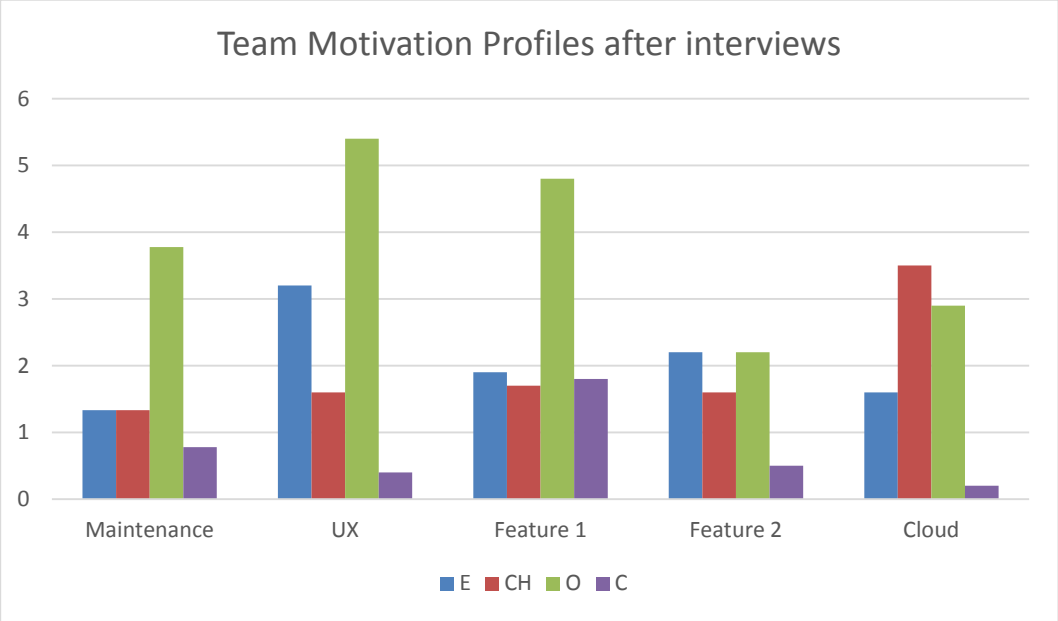


Figure 4. Team Motivation Profile after Interview analyzes

For all teams we observe that Extrinsic Motivation Outward is scoring highest followed by Instrinsic Motivation Fun/Enjoyment as second highest except for the Cloud team that has Intrinsic Motivation Challenge as second highest.

Further we observe that for all teams except for F1, Extrinsic Motivation Compensation is scoring lowest.

We have to remember that results are an average indication covering the whole period of 10 weeks during which different rewards were applied and not every team had the same rewards.

5.3.3 Performance results

Performances used by Borst and to be measured in this study were Quantity, Novelty and Future use Value (Decision to Participate was beyond the scope of this study).

Analyzing the Performance results we find that Rewards have not been equally to all teams, for example Maintenance did not get the Day-off Reward and F1 didn't get the Money Reward.

	Sprint 1 No re-ward	Champion	Pizza	Money	Day-off	None	Total
Maint.	81	30	33	50			194
UX	62		80	45	49	61	297
F1	36	61	66		41		204
F2	164	62	59	80		90	455
Cloud	23	6		10	10	10	59
Total	366	159	238	185	100	161	1209

Table 18. Performance Quantity of all Teams during different Rewards

We also observe a surprising high Quantity of F2 Team during the first sprint with No Reward (164) and a surprising low total Quantity of the Cloud team during al sprints (59). This could be an indication that Teams have different tasks and that certain tasks include many small commits and other tasks that are more complex include only a few tasks.

We expected that Quantity would be increasing over time because participants would get more skilled after some time but this does not show in the results.

5.3.4 Motivation Profile vs Performance

5.3.4.1 Survey

	TMP	Sprint 1 none	Sprint 2 champ	Sprint 3 pizza	Sprint 4 money	Sprint 5 money	To-tal
maint	L/L	112 none	92 pizza	82 day off	82 money	32 none	400
ux	H/L	167	109	96	56	163	591

		none	none	champ	pizza	day off	
f1	L/L	137	117	119	122	89	584
		none	money	none	champ	pizza	
f2	L/H	166	117	67,75	111,75	88	551
		none	day off	Money	none	champ	
cloud	L/H	133	89	71	71	52	416

Table 19. Motivation Profile vs. Performance (Survey)

This Table supports Hypothesis 1 that H/L Teams performs best in unrewarded activities. H/H-Teams were not present and so Hypothesis 2 could not be proved.

5.3.4.2 Interviews

		Sprint 1	Sprint 2	Sprint 3	Sprint 4	Sprint 5	Total
	TMP	none	champ	pizza	money	money	
maint	L/L	112	92	82	82	32	400
		none	pizza	day off	money	none	
ux	H/H	167	109	96	56	163	591
		none	none	champ	pizza	day off	
f1	L/H	137	117	119	122	89	584
		none	money	none	champ	pizza	
f2	L/L	166	117	67,75	111,75	88	551
		none	day off	Money	none	champ	
cloud	H/L	133	89	71	71	52	416

Table 20. Motivation Profile vs. Performance (Interviews)

This table does not support Hypothesis 1 that H/L Teams performs best in unrewarded activities. Best performance of H/H-Teams in rewarded activities is only supported for the day-off reward.

5.3.5 Additional analysis; Mr. X, results

Following earlier analyses the written report of the extra interview with Mr. X was analyzed and Motivation Profile reported for FreeNest and Free time Game development. Results show that Mr. X has high Extrinsic Motivation for FreeNest and High Intrinsic Motivation for Free time Game Development.

5.3.5.1 Referring to FreeNest

	Enjoyment	Challenge	Outward	Compensation

Mr. X	0	0	6	0
Av Intr/Extr	0		3	

Table 21. Mr X. FreeNest Motivation Profile

5.3.5.2 Referring to Free time Game Development

	Enjoyment	Challenge	Outward	Compensation
Mr. X	2	2	4	-1
Av Intr/Extr	2		1.5	

Table 22. Mr. X Free time Game Development Profile

5.4 Conclusions

5.4.1 Summary of Conclusions

This chapter concludes the Thesis. Data from survey and the interviews show different Motivation profiles. Survey data score higher in intrinsic motivation than Interview data. We argued that this was because:

1. One of the two or both methods are not reliable
2. Both are reliable and reflect a part of the truth

We then argue that option no 2 is the correct one and that both data reflect a part the truth. This is in accordance with conclusions of Borst who argues that a specific combination of intrinsic and extrinsic motivations is needed for each crowdsourcing type for optimal performance (Borst I. , 2010, s. 147).

We argue that for Nestronite not only are both intrinsic and extrinsic motivation present but also that it is a process evolving over time, constantly interchanging depending on the task, (in-) tangible rewards and management. It is within these three elements that intrinsic and extrinsic motivation are constantly moving and changing and it is the dynamic interaction between all these three that will at the end determine the level of performance. To illustrate this we introduce the Ignition Triangle of Motivation in Open Source Software Development (Knevel, 2014). With the Ignition Triangle of Motivation we argue that each component has to be present in order to start

and maintain contributions. Additionally we argue that increasing one component does not necessary mean better performance. But when one component is missing it will have a slowing down effect on contributions resulting in a final stop of contributions.

In Mozilla FOSS projects we find that contributors are people with a face and a personal profile and that their contributions are being recorded and Most Experienced Contributors and Recent Active Contributors are listed. This is a way of immediate feedback and recognition by the Management team for the contributor and his/her contribution. On the persons profile his/her contributions are put in a graph by commits per project and commits by language. These are Outward rewards responding to the Extrinsic Motivation of Recognition and Reputation (BLACKDUCK/Open HUB, 2014). Apparently the Mozilla management is expecting that their contributors are Highly Extrinsically Motivated and are they aiming for “usefulness for other people” of contributions by emphasizing recognition in their communication. According to the study and conclusions of Borst the Mozilla organization (non-profit/ no financial rewards) would perform best (in terms of decision to contribute, quantity and novelty) with High Intrinsic and Low Extrinsic Motivated Contributors. That would mean, according to the results of Borst, that if the Mozilla organization would emphasize more the Fun and Challenge aspects to their contributors, the organization would benefit most from the contributing community. On the other hand however Mozilla is ranked No. 1 in FOSS Development and are they not lacking interest from the volunteer FOSS community.

IGNITION TRIANGLE OF MOTIVATION

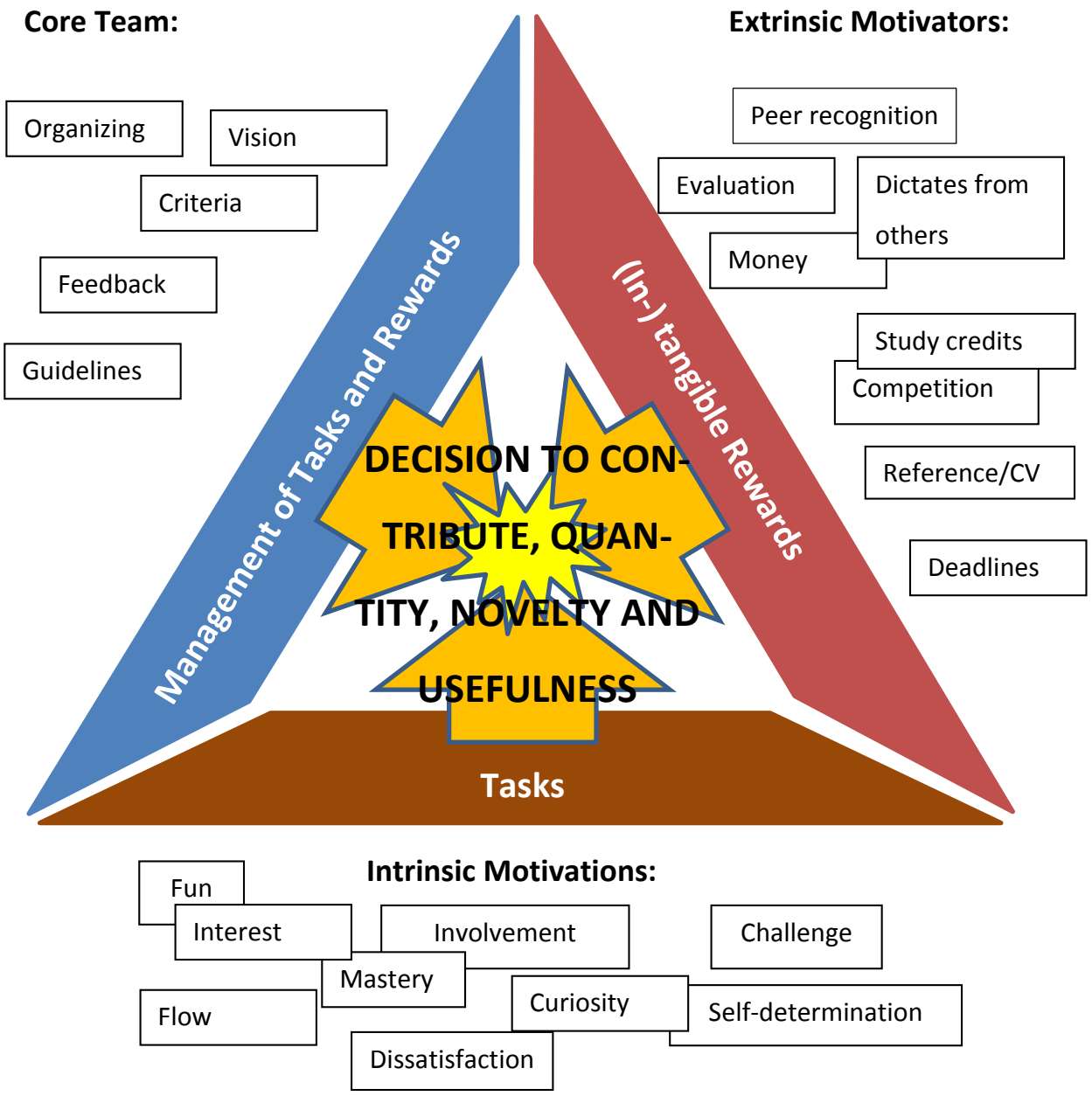


Figure 9. Ignition Triangle of Motivation in Open Source Software Development (inspired on the Triangle of combustion) (Knevel, 2014)

5.4.1.1 Tasks

Are the tasks enjoyable and challenging? We argue that Fun and Challenging task are responsible for participation and learning and necessary for developing the skills needed for successfully completing the tasks. Contributions will be plenty and so will

be novelty of contributions. After some time when participants are getting familiar with the tasks and the level of Fun and Challenge of the tasks drops, intrinsic motivation drops as well and participants will look for other challenging of enjoyable tasks or the other possibility is that Extrinsic Motivation will take over and they will continue to contribute and their contributions will increase in usefulness. Task that were enjoyable in the past will not be enjoyable in the future but evolve over time.

5.4.1.2 (In-) tangible rewards

We argue that (in-) tangible rewards are important for getting the things done. This complies with the results from the cross examination interview with Mr. X who has high score on Extrinsic Motivation from the interviews and explains that deadlines, peer recognition, competition are important motives for "getting the job done." Needs for (in-) tangible rewards will as well evolve over time and not be the same as before. After some time the contributor will look again for Fun and Challenging activities to feed his need for creativity or self-determination.

5.4.1.3 Management

We argue that Management or Core team is important for following contributor's performance, giving feedback, respond to changes in Intrinsic and Extrinsic Motivation of contributors by managing Tasks and (in-) tangible Rewards. This complies with Borst who observed that through the reward criteria, the firm can more clearly communicate which contributions the firm would like to receive (Borst I. , 2010, s. 145). This also explains the drop in motivation of all groups during the time that management is on vacation.

We argue that for Nestronite all three components have to be present as all participants are balancing between intrinsic and extrinsic motivations and the feedback/input from Core-Team but that it depends on the combination of Intrinsic/Extrinsic motivation of the participant and the desired performance (Decision to contribute, Quantity, Novelty or Usefulness) what need to be emphasized in management communication to the participant.

5.4.2 Findings and conclusions Nestronite

The key questions in this thesis were how to keep contributors in Open Source Software Development (Nestronite) motivated and how to maximize their Performance. We expected that participants have a mix of Intrinsic and Extrinsic Motivations and Individual Profiles could be used for deducting the Team Profile. In order to cross-examine the results from the WPI survey we conducted interviews and expected that these would support each other. But we also expected to find changes in Motivation as different Rewards were applied. We collected Performance data and expected to find changes in Performances with different Rewards. We expected that H/L Teams would perform best in unrewarded activities and H/H Teams to perform bet in Rewarded activities.

DH 1	H/L Teams perform best in unrewarded activities.	Partly Supported
DH 2	H/H Teams perform best in rewarded activities	Partly supported
OH 1	The WPI gives an accurate reflection of Individual Motivation of Participants	n/a
OH 2	The Team Motivation Profile deducted from Individual Profiles is an accurate reflection	Partly supported
OH 3	Nestronite can create desired Team Motivation Profile based on Individual WPI results	Partly supported

Table 23. Testing of hypotheses

We conclude that overall WPI results score Higher in Intrinsic Motivation that Interview results. This could have been caused by the self-selection if highly intrinsically motivated would have been more likely to respond. But since all 22 participants (100%) responded this possibility is excluded. However one could argue that respondent have respond in the Survey more positive to Intrinsic Motivations (Fun and Challenge) as Survey was held at the beginning of the case and participants were still excited, not knowing what to expect.

We concluded that Intrinsic Enjoyment scored highest in the Survey. This supports earlier arguments that Fun is a main drive for the Decision to participate (Borst I. , 2010, s. 70).

The fact that survey and interviews show different results needs further investigation. At this stage we argue that both results are a reliable reflection of Motivations and that both Intrinsic and Extrinsic Motivations are present and necessary for maximum Performance in completing the activity.

From the survey we can conclude that H/L Motivation Profile is performing best in Non-rewarded activities. But from the Motivation Profile from the Interview this is only partly supported.

We conclude from the interviews that the Pizza reward was received by participants as the best reward and called a Fun reward.

Champion, Day-off or Money were received with feelings of awkwardness as these were individual rewards and participants were encouraged to work in Teams.

We recognize that Rewards need to be managed better as in the FreeNest case, all Rewards were awarded independent of performance and variety of Rewards was limited. Also more sophisticated Rewards as used in FOSS development (example Mozilla Firefox) need to be applied.

The Online Team Performance Assessment data have not been used in this study for analyzing and conclusions. It would be interesting to analyze these and check the earlier conclusions.

For further study it would be interesting to get more empirical Data and improve the methods of the Interviews to see if the difference in results between WPI and Interviews remains the same.

It would be very interesting to see a Motivation and Reward method developed based on the Ignition Triangle of Motivation and tested.

REFERENCES

Admin, b. (2012, March 1). *Blur*. Retrieved from www.blugroup.com/blogs/group/crowdsourcing-facts-and-figures.

Antoniadis, G. L. (2007). Incentives for Resource sharing in Self-Organized Communities: from Ecocnomics to Social Psychology.

Aslander, M. a. (2010). *'Easycratie', De toekomst van werken organiseren.*

BLACKDUCK/Open HUB. (2014, 11 24). Retrieved from https://www.openhub.net/

BLACKDUCK/Open HUB. (2014, 11 24). Retrieved from dfaurekde: https://www.openhub.net/accounts/dfaurekde

Borst, I. (2010). *Understanding Crowdsourcing - Effects of Motivation and Rewards on Participation and Performance in Voluntary Online Activities.*

Borst, I. (2010). *Understanding Crowdsourcing - Effects of Motivation and Rewards on Participation and Performance in Voluntary Online Activities.*

Borst, I. V. (2008). Motivations and contributions in crowdsourcing activities. *International Product Development Management Conference.* Hamburg.

Brabham, D. C. (2008). *Moving the crowd at iStockphoto: The composition of the crowd and motivations for participation in a crowd sourcing application.*

BSA, B. S. (2007). *Software Industry Facts and Figures.* Washington, DC 20036: BSA.

Chapman, A. (2002). *Leadership/management*. Retrieved from Douglas McGregor's XY Theory: http://www.businessballs.com/mcgregor.htm

Deci, E. L. (1972). The Effects of Contingent and Noncontingent Rewards and Controls on Intrinsic Motivation. *Organizational Behavior and Human Performance*, 217-229.

Deci, R. M. (2000). Intrinsic and Extrinsic Motivations: Classic definitions and New Directions. *Contemporary Educational Psychology 25*, 54-67.

Fowler, M. (2012, December 13). *Martin Fowler.* Retrieved from The new methodolohy: http://www.martinfowler.com/articles/newMethodology.html

Gagné, M. a. (2005). Self-determination theory and work motivation. *J. Organiz. Behav.*, 331-362.

Hars, A. a. (2002, 6). Working for free? Motivations for Participating in Open-Source Projects. *International Journal of Electronic Commerce*(3), 25-39.

Howe, J. (2006). The Rise of Crowdsourcing. *Wired*(14), 176-183.

Howe, J. (2008). *Crowdsourcing - Why the Power of the Crowd is driving the Future of the Business.*

Josh Lerner, J. T. (2005). The Economics of Technology Sharing: Open Source and Beyond. *Journal of Economic Perspectives*, 99-120.

Kananen, J. (2011). *Rafting throught the Thesis Process.*

Kaufmann, N., Schulze, T., & Veit, D. (2011). *More than fun and money. Worker Motivation in Crowdsourcing - A Study on Mechanical Turk.* AMCIS.

Korver, B. F. (2011). *Biblical use of rewards as a motivation for christian service.* Lynchburg.

Kunelius, K. (2012). *Digile, Cloud Software Finland*. Retrieved from Vuoden yrittäjyysteko JAMKiin: http://www.cloudsoftwareprogram.org/news-in-finnish/i/27941/1341/vuoden-yrittajyysteko-jamkiin

Kuosmanen, P. (2012, 5 25). *DIGILE*. Retrieved from Activityblog: http://www.activityblog.fi/2012/05/viikon-tulos-vuoden-korkeakoulujen-yrittjyysteko-jyvskyln-ammattikorkeakoululle/

Lakhani, K. R., & Wolf, R. G. (2005). *Why Hackers Do What They Do: Understanding Motivation and Effort in Free/Open Source Software Projects.*

Lakhani, K. R., & Wolf, R. G. (2005). *Why Hackers Do What They Do: Understanding Motivation and Effort in Free/Open Source Software Projects.* Boston: The Boston Consulting Group.

Layton, M. C. (n.d.). *Agile Project Management for Dummies.* Hoboken, New Jersey: John Wiley & Sons Inc.

Marc A. Musick, J. W. (2007). *Volunteers, a social profile.* Indiana University Press.

Maria J. Antikainen, H. K. (2010). Rewarding in open innovation communities - how to motivate members. *International Journal of Entrepreneurship and Innovation Management*, 440-456.

Mark Saunders, P. L. (2009). *Research methods for business students.* Harlow: Pearson Education Limted.

Mauerer, W. (2008). *Linux Kernel Architecture.* Wiley Publishing.

Nieminen, M. (2013). *Cloud-Based Service desk trends and future in the context of FreeNEST.* Jyväskylä: JAMK-University of Applied Science.

Openness, T. (2014, October 21). *Microsoft.* Retrieved from Openness: http://openness.microsoft.com/blog/2014/10/21/microsoft-loves-linux-cloud/

Pilz, D., & Gewald, H. (2013). *Does Money Matter? Motivational Factors for Participation in Paid- and Non-Profit-Crowdsourcing Communities.* Wirtschaftsinformatik Proceedings.

Riley, J. (2012, September 23). *Tuto2u*. Retrieved from Human Resource Management: http://www.tutor2u.net/business/people/motivation_theory_taylor.asp

Robson, C. (2002). *Real World Research* (2nd edition ed.). Blackwell.

Runeson, P. a. (2008). Guidelines for conducting and reporting case study research in software engineering. *Empir Software Eng*, 131-164.

Runeson, P., & Höst, M. (2009). Guidelines for conducting and reporting case study research in software engineering. *Empir Software Eng*, 131-164.

Ruuska, J. (2014, October 20). *Open Living Lab*. Retrieved from Human Tech Living Lab: http://www.openlivinglabs.eu/livinglab/humantech-livinglab

Shaul Oreg, O. N. (2007, November 14). Exploring motivations for contributing to open source initiatives: The roles of contribution contyext and personal values. *Science Direct*, pp. 2055-2073.

Shuttleworth, M. (2014, 10 23). *Wikipedia*. Retrieved from List of Ubuntu Releases: http://en.wikipedia.org/wiki/List_of_Ubuntu_releases

Sjøberg DIK, H. J. (2005). A survey of controlled experiments in software engineering. *IEEE Trans Softw Eng*, 733-753.

SreekIyer. (2010, September 19). *DeveloperWorks*. Retrieved from Cloud Deployment and Delivery Models: https://www.ibm.com/developerworks/community/blogs/sreek/entry/cloud_4?lang=en

Surowiecki, J. (2004). *The wisdom of crowds.*

Taloussanomat. (2014, 9 22). Retrieved from Yrityshaku: http://yritys.taloussanomat.fi/y/nestronite-oy/jyvaskyla/2433774-0/

Teresa M. Amabile, K. G. (1994). The Work Preference Inventory: Assessing Intrinsic and Extrinsic Motivational Orientations. *Journal of Personality and Social Psychology*, 950-967.

Turunen, I. (2013). *THE SKYNEST PROJECT.* Jyväskylä: JAMK University of Applied Science.

Wiki-Herzberg. (2004 - 2014). Retrieved from Two factor theory: http://en.wikipedia.org/wiki/Two-factor_theory

Wikipedia. (2014, September 6). Retrieved from Motivation: http://en.wikipedia.org/wiki/Motivation

Wikipedia. (2014, 10 24). Retrieved from Open source: http://en.wikipedia.org/wiki/Open_source

Wikipedia. (2014, 10 28). Retrieved from Software portability: http://en.wikipedia.org/wiki/Software_portability

Wikipedia Elias Porter. (2008). Retrieved from Elias Porter: http://en.wikipedia.org/wiki/Elias_Porter

Wiki-Pragmatism. (n.d.). Retrieved from Pragmatism: http://en.wikipedia.org/wiki/Pragmatism

Wiki-Vroom. (2004 - 2014). Retrieved from Expectancy theory: http://en.wikipedia.org/wiki/Expectancy_theory

APPENDICES

Appendix 1. Individual Motivation Profile Survey

Measurement of constructs

The following tables list the survey items. All items are measured using Fully disagree, Disagree, Disagree to some extend, Agree to some extend, Agree and Fully agree. Demographic questions can be found at the end. The questions are inspired by Amabile et al. (1994).

		PRIMARY		SECUNDARY			
				Intrinsic		Extrinsic	
Item No.	Item	IM	EM	E	Ch	O	C
1	I prefer having someone set clear criteria for me in participating the SkyNest Project challenge		x			x	
2	I enjoy to create new solutions for SkyNest Project Challenge that are completely new to me	x			x		
3	As long as I enjoy participation in the SkyNest Project Challenge, I am not concerned about what I am paid.		R				R
4	I am not concerned about what other people think of my solutions to the problems.		R			R	
5	I enjoy trying to ensolve complex problems	x			x		
6	I am less concerned with what activities I do for the SkyNest Project Challenge than what I get for it.		x			x	
7	I enjoy solving SkyNest Project Challenge problems that is so absorbing that I forget everything else.	x		x			
9	I prefer working on solutions with clearly specified procedures and criteria.		x			x	
10	I want that participation in the SkyNest Project Challenge provides me with opportunities for increasing my knowledge and skills.	x			x		
11	I want other people to find out how good my solutions are.		x			x	
14	I have to feel that I am earning something for my participation in the SkyNest Project Challenge.		x			x	
16	Curiosity is the driving force behind my participation to the SkyNest Project Challenge.	x			x		
17	I am keenly aware of the personal benefits that I can receive for the Skynest Project Challenge participation		x			x	
18	I am concerned about how other people are going to react to my solutions to SkyNest project challenge		x			x	
20	No Matter what the outcome of the SkyNest Project Challenge is, I am satisfied if i feel I gained a new expereince	x		x			
22	I believe that there is no point in finding a good solutions if nobody else knows about it.		x			x	
23	What matters most to me when participating in SkyNest Project Challenge, is enjoying what I do.	x		x			
24	I seldom think of financial benefits when participating in the SkyNest Project Challenge.		r				r
26	The more difficult to find the solution to the problem, the more I enjoy it.	x			x		
27	To me success in the SkyNest Project Challenge means doing better than other participants.		x			x	
28	I enjoy to figure out myself how problems can be solved	x			x		
29	I am keenly aware of the possibility to receive financial rewards when participating in the SkyNest Project Challenge		x				x
31	I want other poeple to find out how good my solutions to the problems are		x			x	
32	I prefer to solve simple problems over problems that stretches my abilities	r			r		
33	I want to find out how good I really can be in providing soltions to the problems	x		x			
34	I am strongly motivated by the money that I can earn in the SkyNest Project Challenge		x				x
35	Problem solving is the driving force behind my participation in SkyNest Project Challenge	x			x		
36	I am strongly motivated by the recognition from other people I can earn for my participation in the Skynest Project Challenge		x			x	
37	I enjoy finding relatively simple, straightforward solutions to the problems	r			r		
		13	16	4	9	12	4

Demographics:

Please state your age

Please state your gender (Male/Female)

Please state your group (Maintenance, User Experience, Feature 1, Feature 2 or Cloud)

Appendix 2. Sprint report and Interview questions

Sprint report

General:

Review Date: .....
Your name: .....
Team: .....
Sprint Nr: .....
Reward: .....

Sprint assessment:

Quantity		*Commits during sprint*
Time used		*Total during the sprint as a team*
Accepted/Rejected		*Yes/No*
Novelty		
Future use value		

Interview:

A. About you

1. *Who are you?*

2. *What is your relationship between you and the project?*

3. *How did you get involved?*

B. About SkyNEST in general

1. *What do you think are the most positive aspects of Skynest?*

2. *What are the greatest problems in the Skynest project? (in the whole project level)*

3. *Do you see any threads to the SkyNEST project?*

4. *Do you feel part of SkyNEST Project?*

5. *How was the team work?*

C. Particularly about your role in SkyNEST

1. *What motivates you in the SkyNEST project?*

2. *How do you feel about the teamwork during this sprint?*

3. *How do you feel about your own contribution during this sprint? (Quantity, time, usefulness, novelty, future use value)*

4. *(What do you think about the reward your team got last sprint?)*

5. *Any comment or suggestion to improve the performance for the team?*

6. *Do you think that you have tried your best during last sprint? Why/Why not*

7. *Would like work with SkyNEST also in the future?*

Your remarks:

Appendix 3. Example of Interview Analyses

5. UX team

General:

Review Date: 31.05.2012.....
Interviewer: [redacted].....
Team: User Experience.....
Sprint Nr: Sprint 1.....
Reward: None.....

Sprint assessment:

Quantity	62 commits
Time used	854,5 hours
Accepted Rejected	Yes
Novelty	Improvement to existing
Future use value	Valuable

Interview:

A. About you

Who are you?

1) [redacted]

15

2) Usually people call me [redacted]

What is your relationship between you and the project?

1) I do graphic designing. User interface…uhm…graphic designing
2) In this Skynest project, I'm working in the User experience tem and uh…leading it. I'm pretty much guiding people to work in group and trying to help them as much as possible. It's hard to explain my role, it's quite flexible. I'm doing some work myself but most of the time I just help people and commenting on the work and rank and help them as much as possible.

How did you get involved?

1) I heard about it from e-mail, Ilkka sent me an e-mail and they told us that if we are interest about FreeNest, we can go to hear about them and I... found that I was interested.
2) I think I heard… it was last year when our teacher told us about it. It's summer course and then I heard that they're looking for people for this summer and I went to Ilkka and asked him about what they are going to do this summer. I was pretty interested in it.

B. About SkyNEST in general

What do you think are the most positive aspects of Skynest?

1) To get to…Uhm…learn everything. Like how to do in teams and when there are a lot of teams and they are working together. And they are just great. I haven't had before.
2) I think it's the relax environment but the people, they are, like, really professional and it's like we are doing something that I think that might be some more educational. And, yeah, it gave us the opportunity to learn new stuff that most likely, for myself, I would learn things like next four years in just about three weeks. And I think that it would be a great experience.

What are the greatest problems in the Skynest project? (in the whole project level)

1) - Thu: Ok, so…Have you experienced any problem here… in this project?
- Heli: No, not yet.

2) At least for now it's because people aren't really used to this kind of working environment so… learning the new habit like that srumboard and Kanban working style that we need to take some time so it's just learning…we are just learning right now so I think it will start working later but now it's still quite hard to…how could I say….They just start to learn that working styles but…I think it's really

great when you actually know how they should work.

Do you see any threads to the SkyNEST project?

1) Uh…No, nothing comes to my mind./ It would be nice to work more to this but…it's only this summer. Maybe when…uh…comes another teams, graphic designer teams, maybe that's going to be a bit problem because I don't know if we have anything that we could interface (she meant 'interact'?) in the future. I don't know.

2) Now, at the moment, at least I think we are doing pretty well and at least for myself I'm really enjoying working.

Do you feel part of SkyNEST Project?

1) Yes, I do

2) Yeah…I feel really like a part of this project so…it feels really great to be in such a great working environment.

How was the team work?

1) It's being good, really good. It's nice that we are in the same room and, so, near each other. It's nicer, better to interact with each other. We can ask anything from each other.

2) I think we started a bit slowly but I think we are getting a hand of it and now…uh….this working environment is getting better. And people are, like, they are growing their roles… and everybody starts to know what they are doing…and it makes it much easier to work with people there.

C. Particularly about your role in SkyNEST

What motivates you in the SkyNEST project?

1) I think it's that I get more work experience from this. I think that's the biggest thing. And, it's nice to see sometimes that 'Oh, I did that!'

2) Oh, well, I think mostly that the people working there are really enjoying working with…for example, Ilkka and Narsu. Yeah, I think it's just a great community to work in and this project, in my opinion, is pretty cool and it gives myself a lot of new opportunities and I hope to make like future employers or something like that… through this project.

How do you feel about the teamwork during this sprint?

The same for the question: 'How was the team work in the SkyNEST project?'

How do you feel about your own contribution during this sprint? (Quantity,

time, usefulness, novelty, future use value)

1) Uhm…I think it's good. I'm learning./ uhm…I think the whole team has been doing things very equally. And yes, I do feel being useful. Yeah… We usually do things that already exist but… doing them better.

2)At least I hope I contributed as much as I can. Of course I'm not working as much as the rest of the group. For example, they are doing a lot of graphic stuffs and I'm more, like, helping them and… trying to be a little bit…./uh…For example, quantity and time, I think haven't spent as much time as I can for this project so far and uh… I think every day I have had quite a lot of work to do. And I also think, at least I hope it has been useful for the project and for my team. And… what is the Novelty?/Creative. Yes, of course, our team worked really creative at…It's great that you can share your ideas with everyone and no one comes to say that 'this sucks'

Any comment or suggestion to improve the performance for the team?

1) When we are doing different things and sitting near each other, others can say that 'what do you think about this?' and… I say something and… 'maybe that's not right, you should do that' and… We are, like, doing helping each other./Better… uhm…well, it's being good./ Maybe it's the thing that we all know each other a bit before this… so all are media techniques, so…uhm… we have all seen each other before this.

2) I might have to think a little bit…uhm…A hard question… It's really hard to say because we have only done one sprint so far and we are still learning more but… Yeah, I think in the next sprint, I hope that we can use our working method correctly. For example, we have the board on the wall with the stickers. I hope that we can get that work better than we actually had last sprint.

Do you think that you have tried your best during last sprint? Why/Why not

1) Yes, I think that I have done my best. It's because there are people around me who look at…and I also work as a part of them.…

2) Uh…I think that I have done my best and I hope I can perform even better in the next sprint.

Would like work with SkyNEST also in the future?

1) Yes, of course.

2) uh… yes. And it's likely that I'm working for this project in the future, too.

Appendix 5. Mr X

The meeting with Mr X was agreed three days before and briefly explained per E-mail:

Thank you for your cooperation. As I mentioned I analyzed your motivational profile first according to your answers to the survey and then according to your answers in the interview. I am interested to know: which profile is representing the real Mr X? The survey or the Interview. I tend to believe that the interview is representing your motivation better than the Survey.

Your Motivation Profile according to the **Survey**:
Your Average Intrinsic Motivation score: **3.0** this is Low (compared to the Total Average Intrinsic Motivation score of: 3.8)
Your Average Extrinsic Motivation score: **1.4** this is Low (compared to the Total Average Extrinsic Motivation score of: 1.9)
Mr. X profile according to Survey: Low Intrinsic/Low Extrinsic

Your Motivation Profile according to the **Interviews**:
Your Average Intrinsic Motivation score: **0.3** this is Low (compared to the Total Average Intrinsic Motivation score of: 2.3)
Your Average Extrinsic Motivation score: **3.3** this is High (compared to the Total Average Extrinsic Motivation score of: 2.5)
Mr. X profile according to Interviews: Low Intrinsic/High Extrinsic

When starting the meeting Mr. X already expressed that according to his opinion the second (interview) result (L/H) is giving the more reliable picture of his motivation in the SkyNEST project.

Before going further we gave a brief outline of the study and on which criteria the results are based. We then continued to show some of the results from the survey and the interviews.

Mr. X was very cooperative in thinking through and analyzing his own motivation. I brought a few examples to his attention that in my opinion seemed to be the red line in all his answers: “Ever since I was a kid I’ve been trained to do my job like … without a question” and “Just stuff that needs to be done”. He agreed to these that these are important for him in order to get things done. He referred to his family back ground where they often have to help each other when doing “Talkoot”. (This is a Finnish word, which means helping one and other for example building a new roof. It

is a typical community effort where nobody gets paid expects the same in return when needed help. “Talkoot” could be described as an early way of crowd sourcing). When you do something good for someone else it will always come back to you one way or the other.

Mr X was 23 years of age when he participated in the summer 2012 FreeNest project and worked as Test Automation trainee during the SkyNEST project. He finished his bachelor’s degree in Information Technology from JAMK University of Applied Science in Jyväskylä and is currently working as Project Expert at JAMK.

He has one other brother who is working in the company of his father. His father has a construction company and his mother is also working in JAMK. He is the only one in his family that studied something totally different like IT.

Mr X agreed to have an extrinsic motivated profile in the FreeNest project and explained it like something that needs to be done but doesn’t really care too much. He agreed to be sensitive to peer recognition, feedback from his supervisors and deadlines. By times, he has serious problems motivating himself but when a deadline comes up he is able to do the job fast and efficiently. Especially with jobs with a lot of repetition he gets bored.

A lot of his free time goes to his responsibility as 3D and QA Team leader in a large scale, independent game development team, where he is giving volunteer contributions towards the development of a free, open-world role playing game. He spends between 1 - 6 hrs. per day and really can get “hooked” (secondary intrinsic motivation: task involvement). Because of his position in this field he gets invited to International conventions to speak and give presentation about what they do. Mr. X gets excited when he speaks about this and wants to show the websites on his computer.

Some of his biggest joys he experienced when he was studying 3D-modeling on his own. Nowadays he only experiences this kind of joy when he made an exceptional good model. Money would probably not increase time or contributions or could even have a negative effect.

On the question what kind of person would be the best to participate in FreeNest, he replies: a fun person! Somebody who enjoys and cares. And adds: I really like to work on the games much more than for FreeNest. It is much more interesting. I would like to do it for a living.

He also has been working alone in the MIDEaaS (Mobile Idea as a Service) project in JAMK but doesn't like that (Need for social relatedness, (Borst I. , 2010)). He needs the interaction with other people. Later this year he will start working with the "Need 4 Speed"- team in JAMK. "Need 4 Speed" is the name of the new project in JAMK that is replacing SkyNEST and is also funded by TEKES.

In conclusion:

The Individual Motivation Profile is not a static and given fact and has to be seen with respect to the subject to where contributions are given. After getting to know the individual better we find out that the person has high Intrinsic motivation for his role in the game development team and is passionate about 3D-modelling.

We argue in the case of Mr X

1. H/L; that **fun** (intrinsic) and **peer recognition** (extrinsic) are the main drivers for participation in the unrewarded Fallout Equestria project and emphasizing fun will create **persistence** in contributions. Recognition rewards have to be formulated very clearly (Borst I. , 2010, ss. 100, 101).
2. L/H; that **compensation** (extrinsic) and **challenge** (intrinsic) are the main drivers for participation in the FreeNest project and emphasizing personal development will create **novel contributions** and financial rewards will convince participants of the relevance of the task (Borst I. , 2010, ss. 101, 102).

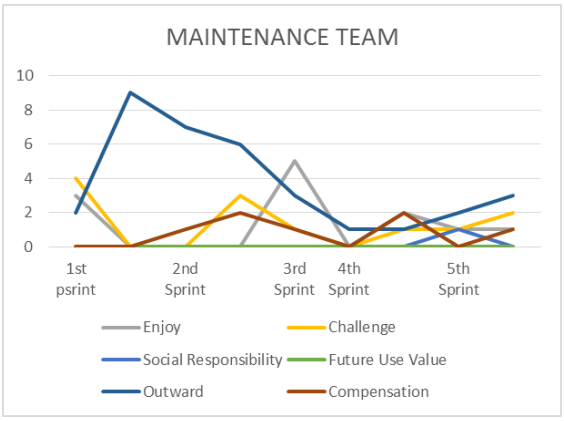
Following the results from Borst this indicates that in the fallout project rewards should be aimed at stimulating

Given his extrinsic motivation in the FreeNest project he will according to Borst conclusions g

Appendix 6. Interview final score tables

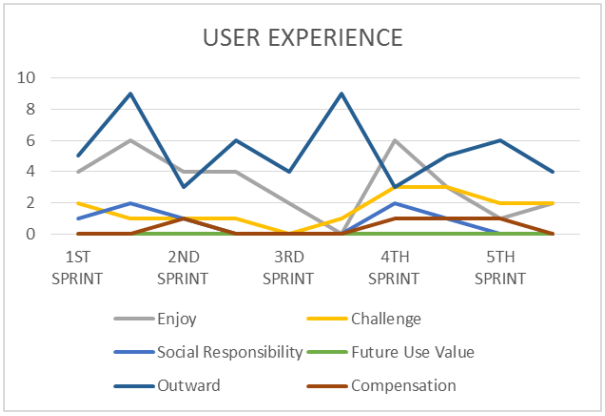
MAINTENANCE

	Enjoy	Challenge	Social Responsibility	Future Use Value	Outward	Compensation
1st psrint	3	4	0	0	2	0
	0	0	0	0	9	0
2nd Sprint	0	0	0	0	7	1
	0	3	0	0	6	2
3rd Sprint	5	1	0	0	3	1
4th Sprint	0	0	0	0	1	0
	2	1	0	0	1	2
5th Sprint	1	1	1	0	2	0
	1	2	0	0	3	1
Total	12	12	1	0	34	7
Total average	1,3	1,3	0,1	0	3,8	0,8



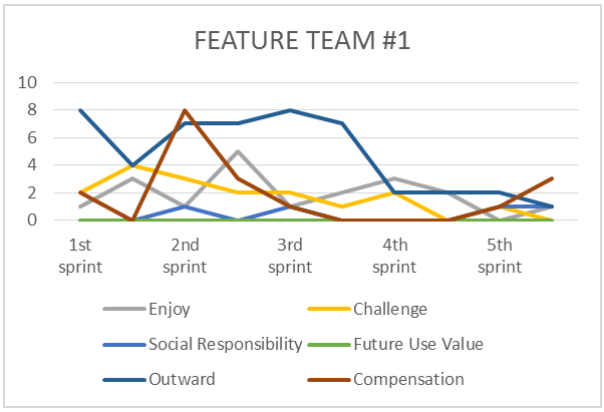
USER EXPERIENCE TEAM

	Enjoy	Challenge	Social Responsibility	Future Use Value	Outward	Compensation
1ST SPRINT	4	2	1	0	5	0
	6	1	2	0	9	0
2ND SPRINT	4	1	1	0	3	1
	4	1	0	0	6	0
3RD SPRINT	2	0	0	0	4	0
	0	1	0	0	9	0
4TH SPRINT	6	3	2	0	3	1
	3	3	1	0	5	1
5TH SPRINT	1	2	0	0	6	1
	2	2	0	0	4	0
Total	32	16	7	0	54	4
Total average	3,2	1,6	0,7	0	5,4	0,4



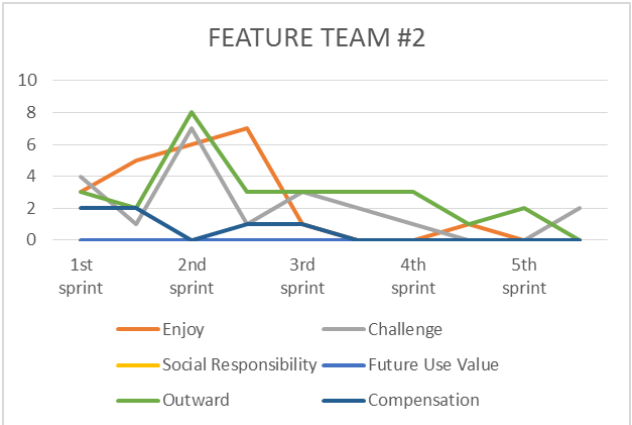
FEATURE TEAM #1

	Enjoy	Challenge	Social Responsibility	Future Use Value	Outward	Compensation
1st sprint	1	2	0	0	8	2
	3	4	0	0	4	0
2nd sprint	1	3	1	0	7	8
	5	2	0	0	7	3
3rd sprint	1	2	1	0	8	1
	2	1	0	0	7	0
4th sprint	3	2	0	0	2	0
	2	0	0	0	2	0
5th sprint	0	1	1	0	2	1
	1	0	1	0	1	3
Total	19	17	4	0	48	18
Tyotal av.	1,9	1,7	0,4	0	4,8	1,8



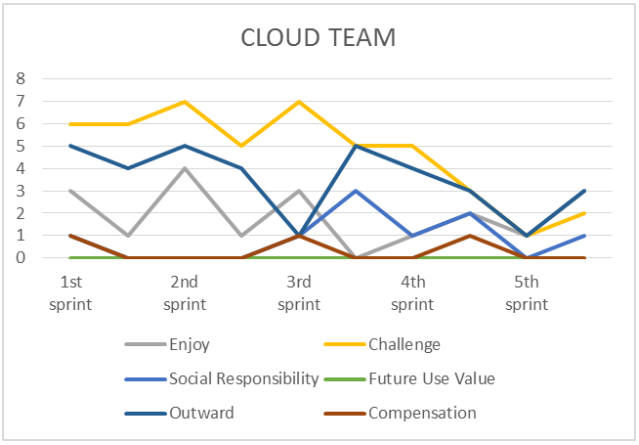
FEATURE TEAM #2

	Enjoy	Challenge	Social Responsibility	Future Use Value	Outward	Compensation
1st sprint	3	4	0	0	3	2
	5	1	0	0	2	2
2nd sprint	6	7	0	0	8	0
	7	1	0	0	3	1
3rd sprint	1	3	0	0	3	1
	0	2	0	0	3	0
4th sprint	0	1	0	0	3	0
	1	0	0	0	1	0
5th sprint	0	0	0	0	2	0
	0	2	0	0	0	0
Total	23	21	0	0	28	6
Total Av	2,3	2,1	0	0	2,8	0,6



CLOUD TEAM

	Enjoy	Challenge	Social Responsibility	Future Use Value	Outward	Compensation
1st sprint	3	6	1	0	5	1
	1	6	0	0	4	0
2nd sprint	4	7	0	0	5	0
	1	5	0	0	4	0
3rd sprint	3	7	1	0	1	1
	0	5	3	0	5	0
4th sprint	1	5	1	0	4	0
	2	3	2	0	3	1
5th sprint	1	1	0	0	1	0
	3	2	1	0	3	0
Total	19	47	9	0	35	3
Total av	1,9	4,7	0,9	0	3,5	0,3



Appendix 7. Survey final score table

	E	CH	Av. Intrin.	O	C	Av. Extrin.
Feature 1	4	2,7	3,4	3,43	-0,4	1,5
	4,5	3,0	3,8	3,14	1,2	2,2
	4,5	3,3	3,9	3,29	0	1,6
	3,75	2,8	3,3	3,00	0,8	1,9
	4,75	3,3	4,0	3,50	1,4	2,5
Feature 2	4,75	3,7	4,2	2,93	0,6	1,8
	4,75	3,3	4,0	3,71	0,8	2,3
	4,25	3,5	3,9	3,71	0,8	2,3
	3,5	2,5	3,0	3,36	0,8	2,1
User Experience	5	4,0	4,5	3,00	0,6	1,8
	5,25	3,4	4,3	3,86	0,6	2,2
	5	3,1	4,0	3,29	0,2	1,7
	4,75	3,3	4,0	3,57	0,6	2,1
	4,5	2,9	3,7	3,43	0,6	2,0
	5,5	3,5	4,5	2,93	0,6	1,8
Cloud	5	3,6	4,3	2,64	0,8	1,7
	3,75	2,5	3,1	3,43	0,4	1,9
	4,5	2,9	3,7	3,50	1,2	2,4
Maintenance	3,5	2,5	3,0	2,71	0	1,4
	4,75	2,8	3,8	2,79	0	1,4
	5	3,5	4,3	2,64	0,2	1,4
	4,5	2,8	3,7	2,79	0,8	1,8
Total	99,75	68,8		70,6	12,6	
Total av.	4,5	3,1		3,2	0,6	
Total Av Intrinsic			3,8			
Total Av Extrinsic						1,9

Appendix 8. Websurvey FreeNest

FreeNest Websurvey
Part 1

	Fully disagree	Disagree	Disagree to some extent	Agree to some extent	Agree	Fully agree
I prefer having someone set clear criteria for me in participating the SkyNest Project challenge	□	□	□	□	□	□
I enjoy to create new solutions for SkyNest Project Challenge that are completely new to me	□	□	□	□	□	□
As long as I enjoy participation in the SkyNest Project Challenge, I am not concerned about what I am paid.	□	□	□	□	□	□
I am not concerned about what other people think of my solutions to the problems.	□	□	□	□	□	□
I enjoy trying to ensolve complex problems	□	□	□	□	□	□
I am less concerned with what activities I do for the SkyNest Project Challenge than what I get for it.	□	□	□	□	□	□
I enjoy solving SkyNest Project Challenge problems that is so absorbing that I forget everything else.	□	□	□	□	□	□
I do not experience social responsibility when participating in the SkyNest Project Challenge.	□	□	□	□	□	□
I prefer working on solutions with clearly specified procedures and criteria.	□	□	□	□	□	□
I want that participation in the SkyNest Project Challenge provides me with opportunities for increasing my knowledge and skills.	□	□	□	□	□	□

FreeNest Websurvey
Part 2

	Fully disagree	Disagree	Disagree to some extent	Agree to some extent	Agree	Fully agree
I want other people to find out how good my solutions are.	□	□	□	□	□	□
I am less concerned with what activities I do for the SkyNest Project Challenge than what I get for it.	□	□	□	□	□	□
To me to be really innovative is the most important when working with the SkyNest Project Challenge.	□	□	□	□	□	□
I have to feel that I am earning something for my participation in the SkyNest Project Challenge.	□	□	□	□	□	□
I prefer working on solutions with clearly specified procedures and criteria.	□	□	□	□	□	□
Curiosity is the driving force behind my participation to the SkyNest Project Challenge.	□	□	□	□	□	□
I am keenly aware of the personal benefits that I can receive for the Skynest Project Challenge participation	□	□	□	□	□	□
I am concerned about how other people are going to react to my solutions to SkyNest project challenge	□	□	□	□	□	□
I feel that I am contributing to solutions when participating in SkyNest Challenge Project	□	□	□	□	□	□
No Matter what the outcome of the SkyNest Project Challenge is, I am satisfied if i feel I gained a new expereince	□	□	□	□	□	□
I want that participation in the SkyNest Project Challenge provides me with opportunities for increasing my knowledge and skills.	□	□	□	□	□	□
I believe that there is no point in finding a good solutions if nobody else knows about it.	□	□	□	□	□	□
What matters most to me when participating in SkyNest Project Challenge, is enjoying what I do.	□	□	□	□	□	□
I seldom think of financial benefits when participating in the SkyNest Project Challenge.	□	□	□	□	□	□
I have to feel that I am earning something for my participation in the SkyNest Project Challenge.	□	□	□	□	□	□
The more difficult to find the solution to the problem, the more I enjoy it.	□	□	□	□	□	□
To me success in the SkyNest Project Challenge means doing better than other participants.	□	□	□	□	□	□

FreeNest Websurvey
Part 3

	Fully disagree	Disagree	Disagree to some extent	Agree to some extent	Agree	Fully agree
I enjoy to figure out myself how problems can be solved	□	□	□	□	□	□
I am keenly aware of the possibility to receive financial rewards when participating in the SkyNest Project Challenge	□	□	□	□	□	□
I feel responsible for providing solutions to problems when participating in SkyNest Project Challenge	□	□	□	□	□	□
I want other poeple to find out how good my solutions to the problems are	□	□	□	□	□	□
I prefer to solve simple problems over problems that stretches my abilities	□	□	□	□	□	□
I want to find out how good I really can be in providing soltions to the problems	□	□	□	□	□	□
I am strongly motivated by the money that I can earn in the SkyNest Project Challenge	□	□	□	□	□	□
Problem solving is the driving force behind my participation in SkyNest Project Challenge	□	□	□	□	□	□
I am strongly motivated by the recognition from other people I can earn for my participation in the Skynest Project Challenge	□	□	□	□	□	□
I enjoy finding relatively simple, straightforward solutions to the problems	□	□	□	□	□	□

Appendix 9. Team Performance

MAINTENANCE TEAM

	Sprint 1	**Sprint 2**	**Sprint 3**	**Sprint 4**	**Sprint 5**
REWARD	No reward	Champion	Pizza	Money	Money
QUANTITY	81	30	33	33	17
TIME USED	307	268	237	255	64.5
ACCEPTED/REJECTED	YES	YES	YES	YES	Yes
NOVELTY	YES	YES	YES	NO	Yes
FUTURE USE VALUE	VERY	VERY	VERY	YES, Long term	OK

CLOUD

	Sprint 1	**Sprint 2**	**Sprint 3**	**Sprint 4**	**Sprint 5**
REWARD	No reward	Day off	Money	No reward	Champion
QUANTITY	23	10	10	10	6
TIME USED	330.5	211.75	174	176	120
ACCEPTED/REJECTED	yes	Yes	Yes	Yes	Yes
NOVELTY	Yes	Yes	No	No	No
FUTURE USE VALUE	yes	yes	Yes	Yes	Yes long term

UX

	Sprint 1	**Sprint 2**	**Sprint 3**	**Sprint 4**	**Sprint 5**
REWARD	No reward	Pizza	Day off	Money	No reward
QUANTITY	62	80	49	45	61
TIME USED	854.5	519.75	470	202	857
ACCEPTED/REJECTED	YES	Yes	Yes	Yes	Yes
NOVELTY	YES	No	No	Yes	Neutral
FUTURE USE VALUE	OK	Yes	yes	Yes	Valuable

F1

	Sprint 1	**Sprint 2**	**Sprint 3**	**Sprint 4**	**Sprint 5**
REWARD	No reward	No reward	Champion	Pizza	Day off
QUANTITY	36	68	61	66	41
TIME USED	599.5	443.75	458	496	327.5
ACCEPTED/REJECTED	YES	Yes	Yes	Yes	Yes
NOVELTY	10 (SIMILAR TO EXISTING)	Yes	Yes	3 neutral	Yes
FUTURE USE VALUE	8 (VERY)	3 x long term	9: very valuable	3 long term	3 long term

F2

	Sprint 1	**Sprint 2**	**Sprint 3**	**Sprint 4**	**Sprint 5**
REWARD	No reward	Money	No re-ward	Champion	Pizza
QUANTITY commits	164	80	90	62	59
TIME USED	460.5	348.5	121	345	253
ACCEPTED/REJEC-TED	yes	Yes	yes	Yes	yes
NOVELTY	neutral	No	yes	Neutral	Neutral
FUTURE USE VALUE	yes	Yes-long term	Yes-Long term	Yes long term	Yes long term